EDISON ELECTRIC INSTITUTE BULLETIN

AUGUST, 1940

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EDISON ELECTRIC INSTITUTE

THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

CLASSIFICATION OF SALES (Revised Series)

	1940	1939	%
Number of Customers as of MAY 31st			
Residential or Domestic	24,326,728	23,533,393	+ 3.4
Rural (Distinct Rural Rates)	660,707	585,298	+12.9
Commercial or Industrial:			
Small Light and Power	4,219,031	4,173,673	+ 1.1
Large Light and Power	179,668	184,728	− 2.7
Street and Highway Lighting	24,036	24,940	.....
Other Public Authorities	87,767	77,969	.....
Railways and Railroads:			
Street and Interurban Railways	208	225	.....
Electrified Steam Railroads	29	31	.....
Interdepartmental	1,250	1,124	.....
Total Ultimate Customers	**29,499,424**	**28,581,381**	**+ 3.2**
Kilowatthour Sales During Month of MAY			
Residential or Domestic	1,787,076,000	1,599,374,000	+11.7
Rural (Distinct Rural Rates)	152,933,000	175,335,000	−12.8
Commercial or Industrial:			
Small Light and Power	1,742,140,000	1,600,830,000	+ 8.8
Large Light and Power	4,798,616,000	3,952,735,000	+21.4
Street and Highway Lighting	142,786,000	139,246,000	+ 2.5
Other Public Authorities	215,168,000	208,013,000	+ 3.4
Railways and Railroads:			
Street and Interurban Railways	315,003,000	314,929,000	+ 0.0
Electrified Steam Railroads	152,603,000	149,468,000	+ 2.1
Interdepartmental	62,402,000	57,732,000	+ 8.1
Total Ultimate Customers	**9,368,727,000**	**8,197,662,000**	**+14.3**
Revenue from Ultimate Customers	**$193,287,500**	**$180,341,500**	**+ 7.2**

RESIDENTIAL OR DOMESTIC SERVICE (Revised Series)

Average Customer Data for the 12 months ended MAY 31st			
Kilowatthours per Customer	921	872	+ 5.6
Average Annual Bill	$36.10	$35.58	+ 1.5
Revenue per Kilowatthour	3.92¢	4.08¢	− 3.9

GENERATION FOR THE U. S. POWER SUPPLY AS A WHOLE FOR THE MONTH OF MAY

	1940	1939	%	1938	1937
Fuel	6,795,790	5,987,505	+ 13.5	5,062,098	5,421,658
Hydro	4,510,637	4,079,455	+ 10.6	3,812,137	4,331,466
Total	**11,306,427**	**10,066,960**	**+ 12.3**	**8,874,235**	**9,753,124**

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume 8 AUGUST, 1940 No. 8

The Seven C's of Public Relations

By Robert Teviot Livingston

Director of Education and Commercial Research, Long Island Lighting Company

Alice: Would you tell me please, which way I ought to go from here?

Cheshire Cat: That depends a good deal on where you want to get to.

WHERE does the Utility Industry want to get to? That is the first question. Any path will lead somewhere, but a goal must be set, an objective named, before intelligent directions can be given. Not until the goal is set can the plans be made, can the price be estimated.

The Public Utility Industry has grown up! It has passed through its infancy and adolescence. Now it is faced with the problems of maturity. Maturity means that there are problems to be faced and solved. One of the most important problems facing the Industry today is that of living with the rest of the people, esteemed and respected. Esteemed for the service it renders. Respected for the ability to render that service efficiently and well.

In the earlier days of the industry, just as in childhood, the principal problem was to grow strong, to develop the necessary facilities which are required to render the service. The utilities have solved that problem, not merely well but in a manner which is the envy of the rest of the world. From a technical and physical standpoint the American utilities lead the whole world.

Today, however, the principal problem is no longer the mere extension, development and improvement of facilities. Now the utility business must solve an even more difficult problem. It must justify its existence under private ownership before the bar of Public Opinion. It is no longer enough to do the job of supplying the customers with gas and electricity. It must demonstrate its right to be permitted to continue to do that job.

MR. LIVINGSTON

The past decade has seen an enormous increase in the participation of government in all forms of economic activity, from regulation to actual operation. For seven years the industry has been under continuous attack from all sides. Now it appears that the tide is changing. The question is whether the tide really has changed or whether it is merely a temporary halt before a still greater flood of attack. It is doubtful if the utilities have been exonerated. It is much more likely that they have only been granted a stay of execution. Probably the public is beginning to feel that the experiments in public ownership and government operation have not demonstrated any great superiority over the operation of the private utilities. In fact, some very clear faults which the advocates of private ownership have pointed out many times for many years have proven to be even worse than anticipated. Loss of tax revenue to local taxing bodies and political preference in operation have been two of the most outstanding faults with propaganda not far behind. So it appears that a halt has been called. The Public seems doubtful of the wisdom of further extension of government activities into the field of public utilities.

If this is so it has great significance. It means that every utility, every operating company and every company directly or indirectly associated with the industry is on trial; is being given a last opportunity to demonstrate its worth. It has been said that private enterprise is doing and can do a better job of operating the utility facilities than the government can. It has been proved by figures. Now it must be proved by acts. Figures are dry reading and a pound of arithmetic proof cannot counter-balance an ounce of customer dissatisfaction. The technical job may have been done superlatively, yet good utility service is more than this. It is more than what is done. How it is done is even as important.

Today the industry stands at the crossroads. It must convince itself of where it wants to go. It must face the facts and realize that there is a price to pay for every goal attained. The goal—good public relations—must be attained. If it is not attained there will no longer be a privately owned Public Utility Industry. The price to be paid is knowledge of the true character of the industry, a sincere attempt to meet its responsibilities, an honest avoidance of the errors of the past and a rededication of the Industry to Public Service.

One of the principal troubles with

public relations in the past was that the industry never really sought the proper goal, never really convinced itself that it had to pay a price. Time was when public relations in the industry consisted of attempting to make everyone an investor. It was believed that the industry was so essential that it could not be unsuccessful. With very consumer an owner, with every utility making money, where could trouble come from? Campaigns were engaged in, stock subscriptions were taken at every door; back as well as front.

The industry had faith in those days! Faith in the nostrums of the times. Faith in the idea, that if you said a thing often enough it would be true. Faith in the idea that the growth and development of the Industry was enough to make up for errors, omissions and indeed commissions. It was believed that propaganda could take the place of accomplishment. The past few years have demonstrated the fallacy of these assumptions. It has been proven that promises cannot take the place of deeds. It is known that promises must be kept. Today promises are measured in the balances of what is done.

Here is the big chance. Now is opportunity knocking at the door. It may never again. The Industry must define a purpose which will meet with Public acceptance, calculate the cost and pay the price. It must dedicate itself truly to Public Service and must win the goal of Public Confidence.

Public Confidence is essential for the continuing success of any business. It is an old truism that a company only succeeds as it finds and continues to satisfy a public need. How much more essential is public confidence to a utility which not only theoretically but actually exists upon the sufferance of the public, performing a vital service because society has granted it the right to do so. The utilities exercise some of the prerogatives of government not because it is their inherent right but because the state permits them to do so. To any business the confidence of the people contributes to success. For a public utility it is the very essence of success.

While public confidence is essential it is more difficult for a utility to win it than with most industries. The reasons usually given are that the industry is regulated and that it is a monopoly. These two answers are correct as far as they go but they do not reach the real root of the matter. There is nothing new about regulation. Industry has been regulated since the days of prehistory. Nor is the utility industry the only one regulated. There is scarcely a single field of economic endeavor in which there is not some form of regulation today. The idea of monopoly is more important. Monopoly has always been distasteful in this country. In many cases it was for an escape from monopoly of one kind or another that our forefathers came to this country. When the monopoly is of something so completely essential as utility service, it is just so much more exasperating.

With other essentialities the consumer has a ready defense against what he may consider unfair—he takes his trade elsewhere. What he gets may be no better but at least it has the virtue of being different. The consumer has practiced his God given right to buy where he wants to. He relieves his anger by "showing them they can't put anything over on him." If he wishes to, when he takes his trade elsewhere, he can refrain from paying his bill for as long as he wishes without it causing him any serious trouble. In general he can enjoy himself thoroughly, expand his ego in a most satisfactory manner and demonstrate his importance to his own complete satisfaction.

But how different is the story with utility services. He applies for service and it is not granted him until he "lays it on the line." If he wants something out of the ordinary done, such as receiving his bill on a certain day, does he get it? No! "It's against the Company's rules." Is his bill presented so he can understand it—not at all. If he delays a few days in making his payment he gets an abrupt form letter. This demonstrates to him that he is just like everybody else—which he resents. He asks for an extension of credit for a few days and he gets a grudging consent, if at all. He cannot take his business elsewhere and he cannot make even himself believe that he is important. His utility treats him like everyone else—in a stereotyped, impersonal way which is not what he wants. He wants to feel that he is a person, not just an account number.

Yet is it the monopoly that irks the consumer or is it the result of the monopoly? To label it MONOPOLY merely means that the solution of the problem is avoided by putting a tag on it. There must be some unique characteristic which makes confidence of major importance to Public Utilities. Perhaps a solution can be found by analyzing what the utilities are really doing. They are not merely selling gas and electricity. They are doing far more than this; something far more intimate and personal. They are doing for people the things that in more primitive times people did for themselves.

A short 100 years ago life proceeded in its ordered way—according to precedent and there was no electricity, no gas, no telephone, no telegraph and almost no railway service. Life was full and people lived in contentment—even peace. It is, of couse, true that today we have more *things* than people possessed 100 years ago and that the average middle class American could be envied his possession by "Le Roi Soleil" but *things* are not what life is measured in. Things do not make for happiness, in fact quite the contrary: things entail responsibility. What is it that we have today which is unique? Leisure! Leisure for the man to know his wife, his children and his home. Leisure for the wife to live as a sentient human being, not as a house chained slave. Leisure that each child may have the opportunity to study and to learn as much as his potentialities will permit, to play and enjoy life while responsibilities weigh lightly. Leisure to see the sun sink. Leisure to appreciate the manifold wonders of life. All these the modern age has given and it is in a large part due to the service which public utilities render that this leisure is possible. This service is a simple one—that which the servant performs for his master. There is nothing which today the utilities do which in a simpler age was not performed by a servant or the master himself.

Life is fuller today because no longer does each man individually have to cut his wood, slaughter his sheep, write long letters, dig his well and tend his livestock. There is more leisure and it is leisure that is paid for when the utility bill is paid. Leisure to follow the pursuits preferred rather than the dictates of necessity. This leisure is given by cooperative effort and the agency of this cooperation is the Public Utility. It is they who perform manual and boring tasks for every one. They are the servants of the people.

This relationship between people and their servants is an important and a peculiar one. What does one expect of a servant? Quiet, calm and continuous

service without attention. The ability to be permitted to carry on the regular and more pleasant or remunerative activities of life without let or hindrance. To think about the servants, to give them orders, to tell them what to do or how to do it seems to prove that the servant is unsatisfactory. They are expected to know what is wanted without being told and to do it immediately no matter how much trouble it may be to them. A servant doesn't put in an eight-hour day. He is expected to be on the job no matter how early or how late. He accommodates his life to the life of the person he serves. When a servant does what is wanted there is no thanks —such service is expected. It is only when it is not done the way it is wanted that attention is paid and such attention is undesirable.

The more essential, continuous and intimate the services of the servant, the less consideration he is given. When there is an occasional job to be done the story is different. Because without the doing of that particular occasional job life is upset, there is gratitude for doing it, pleasure if it is done well and tolerance of the necessity for explanation. Let this job become essential, however, let the servant become continuously employed and the gratitude, pleasure and tolerance goes, the service becomes expected, the servant unthanked.

The attitude of the public to its utilities is normally indifferent acceptance varied with active and personal resentment when anything goes wrong. The indifferent acceptance is caused by the house owner-servant reaction, while the resentment is caused because the public has become so dependent upon its utilities. The whole physical life of the owner is interrupted when the service is interrupted. His life is so much based upon his utility service that there is a psychological shock if his expectation at any time fails him. There is very definite resentment toward the servant who has failed the master.

There is no doubt that there is something lacking in the relations between the public and its utilities. In the technical end of supplying the consumers with gas and electricity a superlative job has been done. Yet something is missing. Electricity is almost everywhere available, bills are rendered accurately with an almost microscopic proportion of error. Still there is dissatisfaction on the part of the Public. The fault does not lie in the doing of the job, it lies in the attitude toward the job. The trouble is Public Relations.

Public Relations includes *all* the relations between the Company and the Public. All relations, not only the relations which occur due to the direct pursuit of the business but also all those relations which may directly or indirectly occur incident to the business. Who is the Public? You are the Public, I am the Public, we all are the Public. The Public because we are consumers of utility service. The Public because directly and indirectly we are the owners of utility security. The Public because we work for public utility companies. The Public because we also are the community, the government, the industry, the vendors and the competitors.

The PUBLIC is a vast, inchoate body, emotional rather than logical. Apparently ruled by taboos and shibboleths rather than reason. And yet the Public is a collection of individuals each with his own individual ideas, needs, wants and desires. As long as the industry continues to think of them as the PUBLIC there will be difficulty in dealing with them. They must be considered as individuals, as persons, with certain definite group needs, desires and emotions it is true, but over and beyond these group requirements they have very definite individual needs, wants, desires and emotions.

Public Relations is the base upon which business success can be built. It is the sum of company accomplishment and public opinion. These two must go together. It has often been said that good public relations are merely applied common sense. Yet it is more than half true that common sense is the most uncommon thing in business. Public Relations properly conceived will give the Industry and the company a "good name," will establish it in the public mind as functioning in the public interest and will endow it with character. Are these public relations merely the relations with the consumers? Public relations are Customer Relations it is true, but public relations cover far more than that. Public Relations are also Employee Relations. Public Relations are Investor Relations and perhaps most important of all, Public Relations are Community Relations. How are these relations any different from many other relations? Why are Public Relations so important? Why is it necessary to consider, and consider seriously, programs for Public Relations? Just exactly what is meant by Public Relations in contra-distinction to the everyday activities of the Public Utilities and their relations with their customers?

What is it that the public, as customers, want? It's very simple. They want what they want when they want it. A snap of the switch and they expect light or power, a turn of a valve—gas, a twist of the faucet—water. When they remove the receiver a pleasant "Number Please" is expected. When they go to catch the 7:52 train they expect it to arrive at 7:52 not 7:50 and not 7:55 but 7:52. So it goes, the Public feels the utilities have made certain definite commitments to them—perhaps contracts. All of modern life is based upon the expectation of the keeping of these unwritten contracts.

How have the utilities been remiss, in what have they fallen short? Is it in the doing of their job, of supplying electricity and gas for example? Hardly! The technical job has been splendidly done. Service is almost everywhere available, quickly, satisfactorily and continuously day in and day out, no longer does a slight storm disrupt the service and it requires a tempest or hurricane to produce an interruption which persists more than a few moments. No one can seriously doubt the technical achievements of the Industry.

Is it the more personal aspect of the business: the commercial, the arrangements for getting electricity in a new or existing dwelling, the reading of meters and rendering of the bills? Perhaps so. This is, in many ways, a more difficult phase of the business because it involves human rather than mere physical relations. These relations with people are more intimate and far more personal than the technical relations.

There is no individuality about the kilowatthour which is delivered, each one is like every other one. There is no personality about the meter, service, transformer or distributing circuit which each consumer uses. Each bill, however, is individually received and individually paid. Each contact is between an employee and a consumer. Here then is individuality, here then is personality involved. The customer feels that his rights are involved; and perhaps more important, because there is an actual personal contact, an actual meeting of two individuals, the relationship is no longer routine, is no longer impersonal.

While it is true that due to the nature of the utility business the vast ma-

jority of the contacts are and will continue to be routine, yet it must never be forgotten that every person is an individual. Not only an individual in his own mind but also in his dealings with others including the servants which serve him. He will accept routinized service and routinized relations as long as routinized service and routinized contacts fit into his idea of himself and what he is doing. When the contact and the relation cease in his mind being a routinized one, he insists upon individual consideration and individual treatment.

The Public is far more than merely a consumer of service. The Public has a much more intimate interest in the Public Utilities than that—intimate as it may be. The PUBLIC owns the utilities and owns them just as truly as if they were what is commonly called "publicly owned." Owns them directly through ownership of securities, for it is said that there are over five million investors in utility securities. Owns them indirectly through the ownership by insurance companies, banks, trust companies, and privately endowed institutions. This too is the *PUBLIC* and Public Relations must include the public as security holders.

Does the trouble lie in the relations between the companies and their security holders? As long as dividends are paid, as long as the management of specific companies and the industry in general do not receive unfavorable publicity, security holders are usually not particularly interested. But when the dividends cease, when newspapers and politicians infer that the insiders make huge profits or the higher officers receive unduly large salaries then the security holders lose their casual and impersonal viewpoint. The holder of but 10 shares of stock in a corporation under these circumstances has a distinct personal interest.

Regardless of the number of shares held, each security holder is part of the public and each should have and has the right to have an interest and a personal interest in the company in which he holds securities. In the twenties, when business was booming and company officers had only good news for their stockholders, the complaint was often made that the stockholders took no interest in their companies. Today the number of stockholder suits indicates that they are taking a real interest and management does not seem to be too pleased. The past few years have not been characterized by the great number of security holders rushing to the defense of the companies in which they held securities. In fact quite the contrary. Yet here is a large section of the Public who without doubt have a two-fold interest, an interest as consumers and an interest as security holders. Why are they not interested in protecting their interests? Can it be that they feel that their personal interest as security holders is not considered an important one by the management? A successful program of Public Relations must embrace the Public as security holders.

The *PUBLIC* embraces the employees. One out of every 25 persons gainfully employed depends upon the Public Utilities directly or indirectly for his livelihood. Not only is this section of the Public entitled to consideration because they are employees but also because they are utility customers—and good ones. They are usually also security holders and perhaps most important of all, they are individuals with friends and acquaintances. One of the most potent fields for the improvement of Public Relations lies in the employees of the Public Utilities—and the most neglected.

How short-sighted a policy that neglects to consider the employee. By far the largest majority are intelligent, well trained and thinking men and women who are an important element in their community. What utility can hope for good Public Relations that does not lay a firm foundation of Public Relations in its treatment of its employees. How can a company persuade the Public, if it cannot persuade its employees. Loyalty is not something which can be bought nor is just to be expected. It is something which has to be built and once built must be maintained. The employee knows what is done, knows what has been done, knows what can be done. The employee cannot be fooled by lip service to the improvement of Public Relations. It must be demonstrated to him that the company intends to take the necessary steps to produce the Public Relations which it says it desires.

The Public also includes the community, the government, the industry, the competitors and the vendors. All have opinions, all have methods of expressing their likes and dislikes, their wishes and desires. All of them must be considered in establishing an adequate plan of public relations.

The basis of success for the establishment of a perfect plan of Public Relations is sincerity; a sincere belief in the necessity, a sincere attempt to practice what is necessary to bring about the desired end. The belief and desire, however, are only the will to succeed. Knowledge and understanding of the problem are the next two steps. Knowledge and understanding mean a willingness to search for the key. The key to success will be found in the "Seven C's":

I. Competence.
II. Care.
III. Conscientiousness.
IV. Courtesy.
V. Consideration.
VI. Cordiality.
VII. Confidence.

The first three "C's" are the "C's" of accomplishment. The Public has a right to expect and to find in its Public Utility servants, competence. The competent employee is able, adequate, capable, fit and qualified. He has all the natural powers, physical or mental, to meet the demands of the situation. He is well trained and able. Competence must be found everywhere from the president to the last clerk hired. Competence can only come by training and equally important, understanding. No program of Public Relations can be considered complete unless and until it embraces an adequate plan of employee training, of executive training and selection: training in techniques and training in the basic theory of the industry. The employees must have the opportunity to gain understanding of the position of the industry in relation to its customers and to the government.

Competence cannot exist without adequate compensation: the workman is worthy of his hire. Good training, ability and qualification alone are not enough unless and until they are used and unless the employee cares and cares enough to use his competence. Cares to do his job and takes care that his job is done well. Conscientiousness means the desire to take care. Care not only to do the job well but to use his conscience in doing the job: to see that the consumer, the investor and the employee get a fair deal. Conscientiousness means to forget immediate self interest. It means rather the desire to do the job in the best possible way. Forgetting immediate self interest does not mean that self interest will not be served. Service properly rendered will mean that self interest is unnecessary. The Public will blow the horn, the utility will not have to.

The careful, competent and conscientious employee solves half the problem. He is able to do his work adequately and well and he is careful to see that it is done that way. However, even this is not enough: as well as the doing of a thing there is the way of doing it, and especially the attitude toward the person for whom it is done. The correct attitude may be summed up in the second three "C's": Courtesy, Consideration and Cordiality. These three "C's" are far more important than it is often realized. Everyone desires courtesy and real courtesy means consideration of other people. True courtesy does not mean doing a thing the way the company wants to do it. Nor does it mean doing it the way the company thinks other people want it done: rather it means seeing the job through the eyes of the customer. Courtesy may seem an old fashioned virtue in these modern times but courtesy is always appreciated. To some, discourtesy is a means of proving independence. Actually it is proof of the contrary. Consideration means considering the public first and one self afterwards. Personal interests are worthy of consideration, it is true, but in the utility business the Public upon whose sufferance and for whose service the industries exist must come first.

Last and certainly not least of these objective "C's" is: Cordiality. The job must be done with care and competence, it is true, and certainly conscientiously and with courtesy and consideration. It also must be done with cordiality. The consumer—The Public—knows that it is the company's job to serve him. He wants to feel, however, that the company wants to serve him—is glad of the opportunity. "The voice with the smile wins" is more than a mere aphorism. The desire for cordiality is the key which unlocks the door of opposition, it is the answer to the puzzle of utility public relations. The job done with real cordiality, with real appreciation of the opportunity to serve will move mountains of resentment.

The last of the "C's" is Confidence. A confident belief in the importance of the job of rendering utility service, a confident belief in the honesty and sincerity of the particular agency, and a confidence bred in assurance that each employee personally and cooperatively is doing his best conscientiously. Confidence in the firm understanding of the place and responsibility of the industry. That is the subjective view of confidence but the objective view is perhaps more important. When service is rendered with the first six "C's" it will not be long before the public will get the seventh "C." It will have confidence in its public utility servant. Confidence that the job will be done better than anyone else could do it. Confidence that the job entrusted to its servant will be done conscientiously. Confidence that for every dollar spent, one dollar or more of service will be rendered. Confidence in the ability of the servant, confidence in the integrity of the servant, and perhaps most important of all confidence in the good will—the cordiality of the servant. Confidence—Public Confidence is the goal. It is the answer to the problem of Public Relations.

These seven "C's" are the key to Public Confidence but they are not the answer. It is not enough to have a key. It must be known how to use the key as well as where to apply it. Public relations requires an understanding as well as a technique. To be successful, any business must be built upon the idea of service and responsibility to the public, none more so than the Public Utility Industry. Public confidence must be merited. Favorable opinion depends upon action not words or promises. The pressure of public opinion is like the pressure of the atmosphere, present though unseen.

Behind the key is the will to be of service. The will is not enough. Beside the will must be the competence. Competence in the specific job done and competent understanding of the whole job and above all an understanding of the problem and of the elements of huhan nature. These do not just come, they must be studied, must be learned. A complete and comprehensive program of employee education is essential. Complete from the president down to the latest addition to the office staff. Comprehensive from job training to human relations.

The basis, the will, the competence through training will produce the desired and necessary public confidence and it is the sum of all these which make good public relations. Public relations, however, are not static. Springing from public opinion they must be ready to meet alterations in public opinion if such alterations occur. And occur they will for public opinion in turn is but the crystallized desires, wishes and experiences of human beings. Public relations must be dynamic.

The industry cannot march alone, it cannot reach its potentialities unless it has this Public confidence. Cooperatively, wonders can be accomplished. Confidence and Trust cannot be purchased, cannot be obtained by demand, by request or by begging. Confidence and Trust must be won and must be deserved. Is that Confidence and Trust merited? Whatever steps are necessary to obtain it must be taken. The Public can never believe it until the industry itself believes it and the industry cannot and must not deceive itself. No program of Public Relations can succeed unless this confidence is founded in fact.

H. R. Woodrow

HARRY RAY WOODROW, vice-president of the Consolidated Edison Company of New York, Inc., in charge of design, planning and inventory, and a director of the Brooklyn Edison Company, died at his home at Bronxville, N. Y., on August 12, after a long illness. His age was 53.

Mr. Woodrow was born on a Minnesota farm on April 15, 1887. He was graduated from Drake University with the degree of Bachelor of Science and in 1911 received the degree of Master of Science from the University of Illinois and was appointed to Sigma Xi. He was elected to Phi Beta Kappa in 1924.

Mr. Woodrow began his career in the electrical industry with the New York Edison Company in 1911 and became the company's assistant chief electrical engineer in 1917. In 1921 he became associated with Stone & Webster, Inc., and for six months in 1922 was employed by the Westinghouse Electric and Manufacturing Company, leaving there to become assistant electrical engineer of the Brooklyn Edison Company. He was elected a vice-president of the Consolidated Edison Company in 1937.

During the last twenty years Mr. Woodrow had served on committees of the American Institute of Electrical Engineers, National Electric Light Association, American Standards Committee and Association of Edison Illuminating Companies. He became a director of the AIEE and a trustee and treasurer of the United Engineering Trustees, Inc. He had been scheduled as a speaker on the program of the annual Edison Electric Institute convention held at Atlantic City in June of this year, but was prevented from appearing by his illness.

"WHERE ELSE BUT HERE?"

THE AMERICAN ENGINEER

Look about you at our ways and means of living
In this twentieth century . . . and go behind the scenes.
Here, unknown to you, are the men who set the stage
for our daily life and provide the means
For the highest living standard the world has ever known.
Here, backstage, in laboratories and testing plants
Are the foremost men of action . . . the American engineers.

These men handle science. They tap
The wealth of nature for our use.
And re-create a world of raw material
For our comfort, convenience and safety.
It's now commonplace to speak of such miracles
As the means whereby we conquer space and darkness
Cold and heat and wind and rain.

The healthful preservation of our foods,
The clothes we wear, the lighting of our homes
In defiance of the night; the cars
We drive and the roads we travel on,
Machines that cut the sky to swiftly span
A continent; contact with any corner of the earth
By radio and telephone and deep-laid cables
Along an ocean floor. All these and more
Were once known only as "black magic" in our dreams
And now, through the patient skill of our engineers,
Have become "white magic" in the routine of our lives.

These men shape our destiny more surely
Than the heads of governments. For they deal
With the greatest power of our age. The sum
Of scientific knowledge has grown so large and strong
That it can build or wreck an empire, blast away
The best of all that men have built, or turn
The wheels of progress for a nation and the world.

Our American engineers are free . . . free from bondage
To a State that searches for its growth
Through the conquest of other peoples. Our country holds
Its destiny secure by creating wealth
Within itself. By encouraging the fight
For human life and not against it.
Where else are a nation's new frontiers
Found in laboratories . . . in the skillful hands
Of engineers . . . Where Else But Here?

FREE ENTERPRISE

Let your imagination picture this tonight:
Some lad who knows that you are wise looks in your eyes
And tells you what he wants to be when he grows up.
What *can* he be?
Your mind flies back across the years,
Reviews careers of men who rose from nothing to be great.
So you relate our country's hist'ry when you say,
"My boy, you may be President some day!"

And that boy dreams, and his big dreams
Continue to come true some way,
Each day throughout the land!
Our leaders stand as witnesses in every field
To the achievement our free opportunity can yield.
Our great executives are few
Who did not start as office boys.
And office boys today shall take their place.
For neither race, religion, nor political belief
Are barricades to opportunity in our America!

Our doctors, lawyers, teachers, scientists
Work freely as they please, their private lives their own.
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That we shall reap as richly as we sow!

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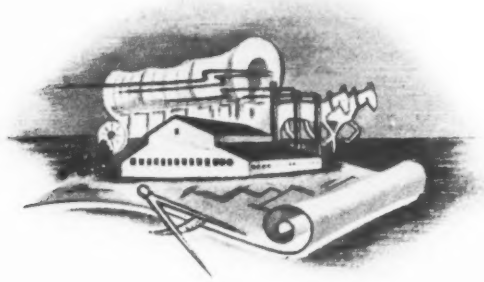
—From Musical Americana, sponsored by Westinghouse Electric and Manufacturing Company



Depreciation—Science or Philosophy?

By Bernard S. Rodey, Jr.

Associate Controller, Consolidated Edison Co. of New York, Inc.

In Public Utilities Fortnightly

ORTHODOX custom requires that everyone writing on depreciation start out by dwelling on the difficulty inherent in the treatment of the subject and on the resulting confusion that bedevils the discussion on depreciation and him who seeks to follow it. An attempt is then usually made to distinguish at least two meanings associated with the term: the engineer's meaning, generally defined as loss in value, and the accountant's concept, amounting in one or another form to a provision for amortization of cost.

Occasionally an author goes still further and endeavors to trace the scope of the word as used and understood by commissions and courts. But rarely has anyone ever found it worth while to investigate the effect of the decisions of management on depreciation, to examine into these causes of replacement of property, which are primarily dependent on judgment, where property is "fired" rather than "retired." True, obsolescence and inadequacy are today almost universally recognized as causes of depreciation, but even here they are taken to denote forces of nature rather than the judgment of man.

This concept of depreciation as a natural event has had a profound influence on its treatment by the regulatory commissions and, though less pronounced, by the courts and legislatures. Events are not subject to dispute, they can merely be ascertained. Discovery of facts affecting the public interest is preëminently the business of regulatory commissions. No business man can properly object to the government's fact finding, since it leaves him unhampered to direct and control the course of his enterprise as he sees fit.

Thus depreciation has been regulated on the theory that it was outside the sphere of management's discretion and that to compel management to record it in certain prescribed ways, was therefore no undue interference with its sphere of control. Protests were considered as an attempt by management to conceal or gloss over a truth, that was unpleasant but nevertheless a fact. Nowhere do we find the position taken by the commissions, that they would enforce the recording of depreciation that had not actually accrued or was inevitably about to accrue. Their continual challenge to the companies was: "Why don't you recognize the facts?"

If now, for the sake of argument, we admit the proposition, that management has the power to influence the accrual of depreciation, to accelerate or retard its occurrence, in short, to exercise discretion in the matter, it follows that the whole philosophy of depreciation controlled by governmental authority, based as it is on an avowed intent not to interfere with the powers of management, must be reëxamined. If our theory of government is to stand, which leaves to management the conduct of its business, and reserves to government the right to be informed of the way the business is conducted, with the power to correct abuses, then depreciation, in so far as it is properly shaped by management policy, must largely to left in the hands of management.

How, then, can management determine depreciation? The answer is, by sagacity, foresight, enterprise, conservatism, by everything that we associate with skillful and prudent management. We have a directors' meeting and the subject discussed is a large tract in the suburbs that has lately been broken up into lots for residential development. Will the expected demand for service materialize? At what rate? The directors discuss real estate, trends in the shift of population, the income class to which their hoped-for new customers will belong. Will the railroad service be electrified, or will steam engines be used?

Are there any ways of gauging in advance the demands upon their facilities? How should the expected demand be served? One man mentions a new type of generator he has recently read about. It was designed on a new revolutionary principle and, if successful, will materially cut costs of manufacturing current. On the other hand, it has never been tried out in practice before and, if a failure, would result in a heavy loss, due to replacement and the necessity of keeping up the service in the meantime. Moreover, to operate most economically, the load must be larger than the new territory can possibly provide.

But our man is rather enthusiastic. Then the question comes up about the cost of installation. Will the price of labor go up or down within the next few years? Would it not be safer to wait? On the other hand, is it not important to provide current employment as far as may be? In the end the vote is taken and it is decided to go ahead and build the new plant which will at the same time replace an old plant in contiguous territory. In other words, the old plant is slated for retirement. Now the remarkable thing, for our discussion, is that the old plant was retired and its depreciation was never even considered.

Neither age nor wear and tear was even mentioned; inadequacy was not a factor, because the old plant is admittedly capable of continuing to serve the territory for which it was designed; obsolescence is at least doubtful. Many competent engineers would not value a machine less merely on a manufacturer's claim that he has a better machine, but which has not yet proved its worth in practice. Yet the old plant is undoubtedly depreciated down to salvage value. And this depreciation is due, largely if not wholly, to the judgment of management and not to any forces over which management has no control.

Now, of course, instances of this kind occur every day. It may be rarely that the facts will be as clean cut as they are presented in our illustration. Generally wear and tear, decay, some degree of obsolescence, and the factors measurable by the engineer will at least be partially responsible for depreciation. But the opposite is certainly just as true. There is hardly any item, whose retirement is not at least in part dictated by a policy of management. No company waits un-

til an item no longer renders service. Very often poor service or even mediocre service will not be tolerated. The Bell Telephone companies have testified to keeping their equipment above 90 per cent condition, and retire what cannot be kept at that standard. Surely outside forces cannot be said to have brought about that depreciation. It is management made, and as such should be left to the discretion of management.

The problem of the relation of management to depreciation was recognized in a case involving one of the largest gas plants in the country. Its equipment, designed for making gas by what is commonly known as the "water gas method," was attacked as obsolete. The "coal gas method" was put forward as a substantially more economical way of making gas, due to the fact that salable coke was produced as a by-product. Apparently the figures were not disputed. But the court refused to accept the argument. The cost of installing the new equipment had been put at $8,000,000.

The disposition of such a sum, the court pointed out, could not be taken away from the management. The court refused to consider the property obsolete. Evidently, whether the property was obsolete or not, depended solely on the decision of management. If they adopted the coal gas method, the old property was obsolete; since they didn't, it wasn't. Any governmental regulation regarding depreciation, which would have compelled the company to adopt one process or the other, would undoubtedly have constituted an undue interference with the management's power. It would, in effect, have represented depreciation caused by the commission.

A statement made in that case by one of the foremost gas engineers in the country, an expert witness for the commission, highlights the point. Said he: "Now, obsolescence is a nice, round term. But I have seen a gas plant run by men, who told me ten years before, that that plant could not conceivably remain in service another month." Our thesis, that depreciation depends on the judgment of management, could hardly be more neatly expressed.

Still, it would hardly be fair to conclude that because depreciation is often and largely a matter of managerial decision, governmental supervision on the subject must be wholly excluded. Quite aside from the fact that much depreciation is undoubtedly the result of outside forces, natural and human, which management must in all fairness be held to report, there exists over and above this, a great public interest in the way a utility is run, that is entirely different from that interest in, say, a clothing factory. If that is run badly and goes out of business, the public can at once turn to numerous competitors, able and anxious to serve it. But if an electric utility is mismanaged into ruin, and must close its doors, the result to the community would be disastrous.

Ample provision for depreciation is a form of prudent management, comparable to the savings of a private individual. The community, and its representatives, undoubtedly have a right to insist—and to make sure—that every reasonable contingency that might threaten the continuance of efficient service at reasonable rates be provided against. But what is reasonable with a small company, may not be tolerated in a gigantic system. And a policy that has proved its worth in a southern climate, may be entirely unsuited for the Rocky mountains.

"Reasonable" shifts its meaning from day to day and from zone to zone. Let us assume that a manufacturing plant is built that generates its own power. Clearly the public interest in supervising its depreciation policy is nil. After a while the plant enters the public utility field by selling its excess current to a few workmen living near the plant. There is now some public interest, but it is very small. In time the sale to the public grows, and eventually the generating facilities serve the entire city. The load required to keep the original manufacturing plant going has become insignificant.

Eventually generating plant and manufacturing plant are legally separated and the manufacturing plant now buys its current. Would anyone contend that the attitude of the regulatory commission towards the generating plant's depreciation problem should not be in the least affected by these successive changes? Is it not apparent that each day has its own problems which must be solved in their own way? Is it not clear that flexibility in application is the only way that will make regulation of depreciation by the commissions tolerable to the companies?

But we hear the answer, that depreciation regulation can no more hurt a company than it can hurt a man to be restrained from squandering all his money and be compelled to invest a generous amount in savings. If that argument is addressed to the proposition that a company should set aside sufficient funds to meet its actual depreciation and the depreciation reasonably to be expected in the next few years, we accept it wholeheartedly. But if we go beyond that point, does not a depreciation reserve become too much of a good thing?

Let us suppose that here is an electric utility plant with a total annual revenue of $10,000,000. Of this 20 per cent, or $2,000,000, is extracted in taxes. Another $2,000,000 goes for supplies, mainly coal and copper. Wages account for $3,000,000. Interest on bonds requires an even million dollars. Dividends approximating, on the combined common and preferred stocks, about 4 per cent, take out another $1,500,000. So that at this point we have accounted for $9,500,000. That leaves $500,000 for depreciation, which is somewhat more than was set aside last year and which the manager of our company, in the light of his experience, especially with this company, considers quite ample.

But now our manager has a talk with a member of the public service commission of his state. The commissioner earnestly assures him that under the uniform system of accounts in force in this state, the amount to be set aside for the depreciation reserve should be at least $2,000,000. The more so, as he takes pains to point out, as the company in the past has also set aside annual amounts for depreciation that would fall below these required by the uniform system.

Our manager listens thoughtfully, and the commissioner, noting the effect of his words, asks him squarely: "Wouldn't you prefer to invest your money in a company with large reserves, rather than skimpy ones?"

The manager admits that he would: "Of course, I'd like to have a large reserve, but I don't know where to take the money. But you stay with me, and I'll run down the list of my expenses, and we'll see what we can do.—Now here is the first item, $2,000,000 for taxes. Maybe we have the answer right here. Two million dollars does seem to me like a lot of money for one year, and I'm willing to use any amount you suggest out of that for depreciation."

But it is evident that that commissioner is not amused, and the manager hurries on to the next item. By chance,

the salesman from the coal firm is waiting outside and called in. "Say Bill, the law compels me to provide a larger depreciation reserve, and I think I'll have to take it out of the coal bill." This statement is greeted by the coal salesman with loud guffaws. "That's rich. You are our most finicky customer. You insist on the quality of coal being just so, you give us delivery schedules almost detailed down to the minute, you hold us responsible if anything goes wrong in transportation, which is not our fault at all. You . . . " Here Bill is cut short and excused.

Our manager looks at his list. The next item is labor. His face becomes harder and his jaw set. He invites the commissioner to attend a meeting of his board of directors, where he will bring up the question of cutting wages to provide for the depreciation reserve. To make sure that no hitch will develop this time, he has already decided not to consult the union heads, but present them with the accomplished cut.

However, the board proves strangely cool to the idea. There is no enthusiasm at all. "Don't the men earn their pay?" he is asked. "Haven't we got the money to pay them?" "What about the reserve?" "Can you think of anything short of an earthquake that would put us in a hole?" The manager has no satisfactory answer. One man sums it up. "We reduced wages back in 1932. We didn't like it. But times were bad. We were roasted like hell in the press. We know for a fact that the resentment had quite a lot to do with the increased taxes that were slapped on us in recent years. Well, we've restored the cuts. We are trying hard to have good relations with the public. Well, you can imagine how a wage cut would hit back at us."

Mr. Smith explodes. He, if any, is the "economic royalist" on the board. "No government is going to tell me to cut my workers' wages, no matter how hard they try to make the workers hate us." The manager is somewhat taken aback. A mild, inoffensive looking man on the board, who hasn't opened his mouth before, startles the discussion to a close: "We have a contract with the union; we can't cut."

The item "Interest on bonds" is passed over without comment. Next comes "Dividends." The manager squares himself for a finish fight. This is his last chance. This is one instance where any real discretion to cut rests with him and his board. He listens grimly to arguments pleading that a 4 per cent return really puts a stock in the class of bonds, and that therefore there must be no default. He ignores the argument that the additional money diverted to depreciation reserve could never be used for replacement of property, and that eventually the excess would be deducted by the courts from the rate base, thus making the stockholders pay for property used up in the service of the customers.

But then a novel point is presented: "If we omit one dividend, our credit will be shot to pieces." "Well," retorts the manager, "I can't help that." "Yes, but you know," a quiet voice persists, "that we are planning to refund practically all our bonds from 5½ and 6 per cent down to a 4 or maybe 3½. The expected saving is likely to be our biggest money-maker this year and for years to come. If we can't even keep up a 4 per cent dividend record in what we present to the public as a sound, well-managed, first-class utility company, we hardly need bother with this refunding procedure."

The manager is desperate. "Our bankers know we are absolutely shipshape. Our bankers know we are in the hands of the commission, no offense to our guest, the commissioner. Besides, it isn't what the bankers think that counts, but what the public believes. And you can't explain away an omitted dividend nohow."

At this point the commissioner takes a hand. "Now, gentlemen, there is no need to curtail any legitimate expense for the purpose of providing the required depreciation reserve. That depreciation has occurred in the service of the public, and it is both lawful and just to recoup the loss by way of the rates exacted from the public. If that can only be done by increased rates, the commission, I am sure, will give careful consideration to any application filed with it for that purpose."

For a moment the room is pervaded by the atmosphere of millennium. To have a commissioner suggest that the rates are too low sounds too good to be true. But the spell is speedily broken. "Isn't it a fact," challenges a man, "that most of our new business in recent years has come from increased demand in utilization? I mean that we've got pretty much every possible customer as an actual customer. We are close to the saturation point there. So we endeavor to educate the public to increased uses of electricity. We persuade them to install radios, to use electric toasters, to do their washing by electricity, to exchange their ice boxes for refrigerators. Now we know that many of these uses are still considered luxuries. The only thing essential is the light and the radio. All our other appliances are still very much on trial. I don't need to tell you how many people with electric refrigerators turn the juice off for months at a time. Still, these new applications are our major chances for new business. If we increase the rates, people will drop electric appliances like hot potatoes. And don't think the newspapers won't harp on the theme that we first create a demand and then try to gouge it. And for what? Not to pay our wages, or debts, or replacements now needed or expected, but to create reserves for a fund which we ourselves admit will not be necessary. Are we in the business of providing electricity or of providing depreciation reserves? If you value your new business, and your good will, you had better explode any ideas about rate increases right now."

Thereupon the meeting breaks up. The two men return to the manager's office, very thoughtful, indeed. In the end the manager speaks up: "Seems to me there is really only one argument between us, and that is whether our reserve is sufficient. If I can convince you that it is, you wouldn't insist on my adding to it. Same way, if you show that it is too small, I'll add to it, and darn quick too.

"Now there seems to be only one way that will really and conclusively prove who is right, and that is the history of the company's experience. We've been in the electrical business a good half century. In that time the game has been revolutionized several times over. You had to have money to junk your equipment and build anew, or you were pushed to the wall. You know that our company has always had sufficient reserves to take advantage of every new improvement in the art. We've never been caught short. Our reserve, which, by the way, is now larger than ever in the history of the company, has proved its sufficiency for half a century.

"There is no indication that the present management is less wise, less careful, less progressive than in the past. It is our responsibility to be alert to prospective needs and how to meet them.

(*Continued on page* 416)

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McGraw Prize Paper

Basis for a Program of Capacitor Additions on a Growing Distribution System

By V. G. Rettig

IN the last several years operating experience has proved static capacitors to be very reliable and inexpensive pieces of equipment for the correction of load and voltage conditions. The economic problem of determining how widely they can be used on a power system and in what increments they should be added to reach that ultimate has become more important.

It is generally recognized that the principal benefits of capacitors on a power system are:

1. Increase of the load carrying capacity of lines and other equipment because of the reduction of load currents.
2. Reduction of copper losses.
3. Increase in revenue resulting from better voltage for certain loads.
4. In some cases, the betterment in voltage to bring it within acceptable limits without reference to the increase in revenue.

The value of capacitors is best determined by an economic comparison of the benefits obtained with capacitors and of the benefits from other system additions that will accomplish the same desired result. Their greatest value comes from the increase in the capacity of lines or equipment to carry added loads drawing lagging currents. It is on this basis that widespread use of capacitors can be justified. They have an advantage over other system additions built to increase load carrying capacity, in that they can easily be added in small increments. It is not necessary to make large investments in capacitors well ahead of an anticipated growth of load.

A large part of the reduction in losses and of the betterment in voltage obtained from capacitors depends on the reduction of load currents that are also obtained when new circuits are added. However, capacitors added to distribution feeders have an effect on the substation transformers, transmission circuits, and even generators, so that it becomes necessary to evaluate these combined effects when considering any capacitor installation.

MR. RETTIG

Mr. Rettig is the winner of the First James H. McGraw Prize for 1940.

Mr. Rettig joined the Cincinnati Gas and Electric Company in 1928 and since 1930 has worked in its Electric Distribution Department on inspection, equipment testing, layout of control and relay protection, inductive coordination, system additions and other general distribution engineering work. He is a graduate of the University of Cincinnati with the degree of Electrical Engineer and is a member of Tau Beta Pi, honorary engineering, and Eta Kappa Nu, honorary electrical engineering, fraternities. He is a past chairman of the AIEE branch at the University of Cincinnati and is now secretary of the Cincinnati Section of AIEE.

On the other hand, the addition of a new circuit or transfer bank will not benefit as many parts of the system, but may improve service reliability or provide emergency ties that make it more desirable than capacitors, even at a higher cost per kva of capacity.

Placing a value on an increase in capacity from capacitors implies that such capacity will be needed in the not too distant future and, hence, that some investment will be saved. Capacity released is of questionable value unless it will be needed within a period of three to five years. There are parts of the Cincinnati system, for example, on which capacitors would reduce load currents, but various factors other than current carrying capacity limit the loading and determine when additions are to be made. This applies in particular to the generating plants and to a large part of the 66 kv system, which is the major transmission and provides the principal synchronizing ties.

The generators are all rated at 80 per cent power factor and the system load has a power factor of about 80 per cent. The spinning reserve for power requirements on the system is at all times great enough to provide the necessary margin of generator capacity to carry the reactive current. Even if the system power factor becomes lower than the power factor rating of the generators, some of the reactive current can be taken care of by installing the electrical equipment only in the form of a synchronous condenser. Hence, the generator capacity released cannot properly be evaluated at including steam equipment.

Capacity released on the principal 66 kv tie lines cannot be evaluated as useful capacity, because no saving or postponement of investment there is brought about by installing capacitors. New lines on the Cincinnati 66 kv system in the past several years have been built in connection with generator additions, to provide better synchronizing ties or to supply large individual loads. It seems probable that future additions will be of a similar nature and that no saving in this construction can be brought about by the reduction of system rkva with capacitors. An interesting point in this connection is that the 66 kv cable installed in 1938 draws about 8000 kva leading as charging current.

It is proposed here to set up a basis for evaluating capacitors on the distribution system to determine how many can

be justified on various parts of the power system, and to determine when they should be added. Relationships have been simplified and curves are included for quickly estimating the increase in carrying capacity of circuits, as well as for estimating losses and the increase in revenue from improved voltage, as capacitors are added in groups or increments. Economic comparisons are made between annual fixed charges on capacitors and annual return for specific cases.

The curves are set up to conveniently handle the common problems on the Cincinnati system, but they can be easily adapted to any standard setup. The smaller customers are supplied from 4150 volt four-wire feeders with more than 95 per cent of the load on feeders equipped with induction voltage regulators. The large majority of the feeders have 250 ampere regulators, No. 0000 cable and No. 00 copper overhead conductor with a multi-grounded neutral. Large industrial customers and most of the substations are supplied at generator voltage (13.2 kv) with 400,000 c.m. cable and No. 0000 bare copper overhead lines the most common sizes. The standard substation transformer bank sizes are 6000, 3000 and 1500 kva.

Installation of capacitors on the 4150 volt feeders only is considered. Capacitors for operation at this voltage can be obtained at a lower cost per kva than any other. As shown in another paper (1), the much higher cost of the 240 and lower voltage capacitors does not justify their use in preference to the 2400 volt units. The investment in equipment to serve a given load on the 4150 volt system is greater than at any other voltage on the system, and, therefore, the maximum of benefit can be obtained with capacitors there.

Increase in Load Carrying Capacity

Since capacitors installed on a 4 kv feeder will increase the load carrying capacity of the feeder, the substation bank, transmission lines, and other parts of the system, and since the capacity released on each part of the system depends on the power factor of the load there, each part is considered separately.

The curves of Fig. 1 show the per cent increase in capacity of a circuit as capacitors are added in successive units or increments equal to 5 per cent of the kva rating of the circuit. The curves are based entirely on the kva rating of a circuit and not on its load at any one time, and give the per cent increase in load of the same power factor as the present that the circuit will carry without overloading. It is necessary to know only the power factor of the maximum loads to apply the curve to a circuit at any rating. At 70 per cent power factor, for example, the first, second and third 5 per cent units would increase the circuit capacity by 3.52, 3.38 and 3.26 respectively, or a total of 10.16 per cent for the total. These are the intercepts of the curves for the various units with the .7 power factor line. If the capacitor addition is equal to 13 per cent of the kva rating, for example, the increase in the first two increments can be taken directly from the curves and the third increment can be obtained by interpolation from an inspection of the curves.

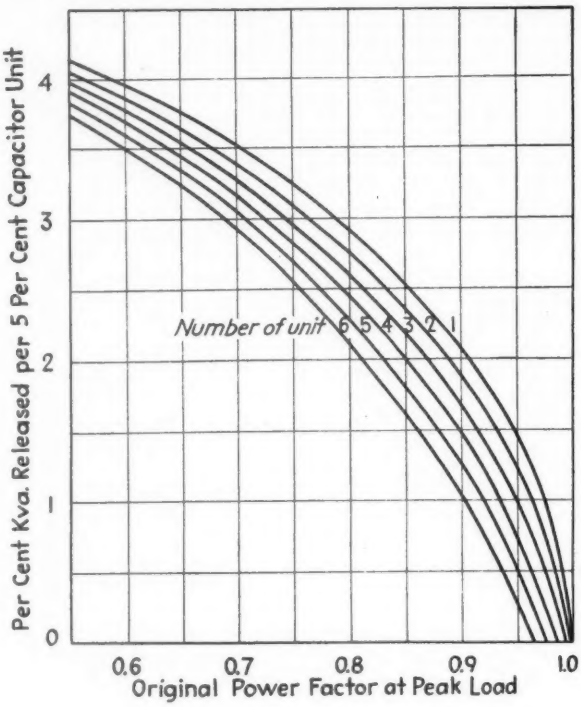


Fig. 1—Per cent increase in Capacity per Capacitor Unit. Where Capacitors are added in Units Equal to 5 per cent of the line or Equipment Kva Rating. Example—90 Kva Capacitor Unit on 1800 Kva Feeder

The value of this increased capacity depends on whether or not it will be needed within a period of several years. Capacitors installed on a distribution feeder that is heavily loaded will produce an increase in capacity that will be needed within a year. The same capacitors may also increase the capacity of lightly loaded transmission lines or transformer banks where the capacity will not be needed for a number of years. In the examples given later in this paper, it is assumed that if an increase in capacity can be used within four years it is valued as new capacity. Where it cannot be used, only the saving in losses and effects of voltage betterment are considered.

Fixed charges on both capacitors and other new equipment is taken as 12 per cent per year. The increase in capacity produced by capacitors is valued at the same figure per kva as new capacity obtained by installing lines or equipment. For example, if the cost of a new 6000 kva circuit to supply an area is $30,000 or $5.00 per kva, any increase in capacity produced by capacitors is valued at $5.00 per kva. Annual return on capacitors is then taken as 12 per cent of this figure plus any saving in losses or increase in revenue that is not obtained with alternative system additions.

The system is broken down into its component parts from the generator bus or from the bus of one of the principal 66 kv substations to the overhead 4 kv line. These parts include the 13.2 kv circuits and circuit breaker positions, the building addition that is necessary when a new substation is built, the 4 kv substation bank and its breaker position, the substation equipment necessary for a new 4 kv feeder only, the necessary conduit and 4 kv cable additions and the 4 kv overhead lines. Each of these component parts must be considered separately be-

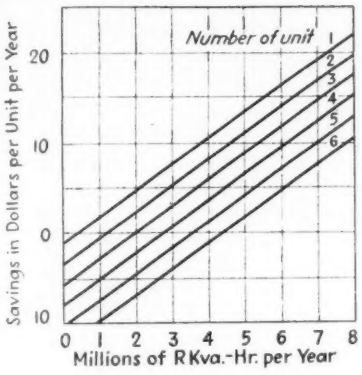


Fig. 2—Saving of Copper Losses in Phases per 90 Kva, Three Phase Capacitor Unit

(a) Per 1000 ft. of 4 kv cable of 0000 copper (R = .056 ohms per phase) with all load at end.
(b) Per 2000 ft. of 4 kv feeder of 00 copper (R = .168 ohms per phase) with uniformly distributed load.
(c) On 3000 Kva, 4 kv bank (R = .56 at 13.2 kv)
(d) Per 10,000 ft. of 13.2 kv line of 0000 copper (R = .56 per phase at 13.2 kv) with all load at end.

cause one of them may represent a bottle neck where increased capacity can be obtained by a small change at comparatively low cost without installing capacitors.

The cost of some of these additions may vary over a wide range depending on location, length of circuits, and the like, and the variation in the cost of others is comparatively small. Where a 4 kv feeder can be added without constructing a new substation building or structure, the cost of a new substation equipment is set at $7.00 per kva, and of 4 kv cable and 4 kv overhead line additions necessary to establish a new feeder at $2.00 per kva for each. The cost of new transformer bank capacity on the same basis may be between $4.00 and $5.00 per kva. The above figures are approximate increment costs and are used only to determine the value of reducing the rkva component of load. In most cases, the actual cost of new equipment at a given location can be taken into account and these approximate figures are unnecessary. Study of the system by parts is necessary to determine in what groups or increments they should be installed rather than what the ultimate on a system should be.

Saving of Copper Losses

Saving of copper losses considered alone will rarely justify the installation of capacitors on a major power system, but the possible saving in loss combined with other advantages may help to justify their use. A complete study of capacitors on a distribution system to determine the optimum balance between capacitors and new capacity must necessarily include a detailed study of savings in losses. Losses largely determine the best location of capacitors on a feeder.

Copper losses on any part of a system vary as the square of the load current, but an analysis of the possible *saving* in losses shows that the saving bears a *linear* relationship to the *total reactive kva-hrs.* supplied and is independent of the shape of the load curve. The losses in a circuit as well as the possible saving depend to a great extent on how the load is distributed on the circuit. An appendix to the paper gives a detailed derivation of the losses and saving in losses obtained with various arrangements.

The maximum loss obviously occurs when all of the load is carried at the end of the circuit and the maximum saving in loss when all of the capacitors are located at that load. This is true of the large majority of the *transmission* circuits on a power system. On most of the 4 kv distribution feeders the condition of uniform load distribution along the main part of the feeder is approached. The losses when all of the load is uniformly distributed along all three phases are only one-third as great as when it is all at the end.

The Cincinnati system employs the "phase area" method of voltage regulation for single phase load; that is, all single phase load in an area close to the substation is carried on phase one, all in an adjacent area on the feeder on phase two, and all at the end of the feeder on phase three. With this system, a feeder carrying single phase loads only, which are uniformly distributed along a feeder, will have a loss in the phase conductors only equal to 4/9 of the loss with all loads balanced at the end. If the loss in a neutral conductor equal to the phase conductor and grounded only at the substation, is added the ratio becomes .613.

A study of savings in losses deals with the reactive current only, which can be dealt with independently of the power components of current. The saving in losses in kwhr bears a linear relationship to the rkva-hrs supplied by a circuit and is a maximum when the rkva-hrs taken by the circuit is equal to the leading kva-hrs taken by the capacitors connected to the circuit. This is shown in Fig. 2 and Fig. 3 for some common lines and transformer banks. The curves are plotted for convenient use with losses valued at

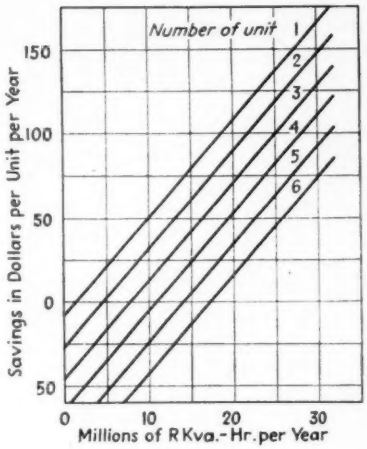


Fig. 3—Saving of Copper Losses per 360 Kva, Three Phase Capacitor Unit

(a) Per 10,000 ft. of 13.2 kv cable of 400,000 cm copper (R = .28 ohms at 13.2 kv) with all load at end.
(b) On 6000 kva, 4 kv bank (R = .28 ohms at 13.2 kv).
(c) Per 10,000 ft. of 33 kv line of No. 2 copper with all load at end.

one-half cent per kwhr to give the reduction in losses obtained with the addition of successive capacitor units. The curves readily show how many units can be added to a circuit before the losses again begin to increase. Other pertinent points that are developed in the appendix to serve as a guide in using these curves are as follows:

1. Capacitors installed in three units at the 1/6, ½ and 5/6 points on a feeder with uniformly distributed load will give a reduction of losses in the feeder main at least 97 per cent as great as the reduction obtained when the capacitors are installed in very small units in the same way as the individual loads. This indicates that capacitors can best be installed in large units and in most cases one in each phase area.

2. When capacitors are installed in three phase units on a feeder supplying a given rkva-hr load the *saving* in losses in kwhr is the same for both the rotated feeder and the one laid out with phase areas; that is, it is independent of the balance of load on the phases. This permits the same curves to be used for all feeders.

3. A capacitor unit will produce the maximum reduction in kwhr loss on a feeder when it is installed at a point where the rkva-hrs carried by the phase conductors is equal to the leading kva-hrs taken by the capacitor unit; that is, when rkva-hr equals 8,760 kva. This is independent of load balance.

4. The saving in losses on a feeder main, with all single phase load uniformly distributed in phase areas, will be 33 to 80 per cent greater when single phase capacitor units are used than when the units are connected three phase. The difference depends on the resistance of the neutral return.

5. For loads between 50 and 100 per cent power factor, an increase in kva of load carrying capacity obtained by circuit additions will produce a saving in losses of only 50 to 60 per cent of the saving produced when that same increase in kva of load carrying capacity is obtained with capacitors.

It should be noted that *rkva-hr can be metered directly* if the cost of losses is high enough to warrant close investigation. Rkva-hr can also be estimated from the peak rkva load and the load factor of the feeder. It is then unnecessary to draw complete load curves to estimate savings in losses and loss estimates are very much simplified.

Increase in Revenue

On a system such as the Cincinnati system, where voltage regulators maintain good voltage for 90 per cent of the load, the possible increase in revenue to be obtained from voltage betterment with capacitors is small compared with savings from other effects. If, as is true of practically all feeders on the Cincinnati system, the voltage regulators have an adequate range of regulation, the only improvement in voltage that can be made to produce an increase in revenue is the reduction of 4 kv primary voltage drop between the first and last customers in a phase area or on a feeder.

In the case where all load on a circuit is connected at one point, the automatic voltage regulators can be made to maintain the maximum permissible voltage at that load. Fixed capacitors on a feeder with voltage regulators can be made to produce an increase in revenue only when load is distributed along the feeder. The possible revenue increase on a feeder with phase areas is smaller than on a feeder where load is rotated on the three phases, because the distance from the first to the last customer controlled by any one regulator is smaller.

On the Cincinnati system, the voltage regulators are set to maintain the maximum desirable voltage at the beginning of each phase area and the voltage drop from the beginning to the end of the phase area is less than 2 per cent on most feeders. With a multi-grounded neutral and load uniformly distributed, the voltage drop from the beginning to the center of the phase areas will be 75 per cent of the total. Assuming then that the maximum permissible voltage is still maintained by the regulators at the beginning of each phase area, after capacitors are in operation, the reduction of drop to the center of the phase area produced by capacitors cannot be permitted to 75 per cent of the total drop. Within this limit capacitors will increase the revenue.

The average increase in voltage throughout the phase area will be 75 per cent of the maximum increase with a capacitor unit at the center of the area. With this as a basis, and assuming the kwhr consumption to increase as the 1.6 power of the voltage, the curves of Fig. 4 are drawn. It should be noted in connection with these curves that *the only very common load on a distribution system for which an increase in voltage will produce an increase in kwhr consumption is lighting load*, and that for lighting the consumption increases as the 1.6 power of the voltage. This also applies to less common loads, such as resistance heaters.

An estimate of the load factor of lighting load only on the 4 kv system showed that it was less than 15 per cent. The curves of Fig. 4 are calculated on the basis that the kwhr consumption from lighting and similar loads is equal to 1000 hours use per year of the peak evening kw load on the feeder and that the revenue increase is at the minimum block rate of 1½ cents per kwhr.

Correction of Unsatisfactory Voltage Conditions

The correction of unsatisfactory voltage conditions will itself sometimes justify the installation of shunt capacitors on a large system, but it is usually only one of the factors contributing to their value. The value and the method of installing capacitors for this purpose depend on: (1) Whether voltage variation from light load to peak load is excessive and requires controlled boost or whether the voltage can be boosted at all times; (2) Whether the improvement in voltage is needed with normal system connections or only with emergency connections. The value placed on them depends on the cost of alternative regulating equipment or other system additions that will give the desired result.

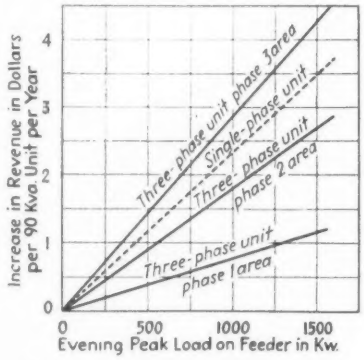


Fig. 4—Increase in Annual Revenue per 1000 ft. of 4150 Volt No. 2/0 Feeder

For 90 kva capacitor units installed at center of phase areas.
Cost of energy 1.5 cents per kwhr (based on 1000 hours use per year of maximum kw load).

Capacitors installed to operate twenty-four hours per day produce a fixed boost on a circuit at all times, the maximum boost depending on the reactance from the power source to the capacitor. (3) A similar effect on the voltage at any one point can be obtained with a fixed booster installed in the line or by changing transformer taps. By properly locating fixed boosters or fixed capacitors on a radial feeder equipped with automatic voltage regulators, it is possible with proper compensator settings to reduce the variation in voltage at most points on a feeder as well as to reduce the drop in voltage along the feeder.

In any case, the fixed booster can usually be considered as an alternative to the fixed capacitor for the correction of voltage with normal circuit operation. The fixed booster will in practically all cases give the required boost in voltage at a much lower cost. However, the capacitor will give a more uniform improvement in voltage along a feeder and the other benefits, combined with its function as a booster, may show that it is to be preferred to the fixed booster.

Fixed capacitors are often more effective with emergency connections than with normal system connections. Many distribution circuits in suburban and semi-rural areas have long ties to adjacent feeders for use during emergencies or during work on some equipment. In some cases, the ties are so long that satisfactory operating voltage cannot be maintained during heavy load periods. This is true of distribution circuits of all voltages. Fixed capacitors will improve voltage under such conditions more than with normal connections.

On a 4 kv feeder where the arrangement is such that load will be supplied in only one direction through a tie, fixed boosters may be used at the tie at a lower cost. If the conductor size in the tie is small, the boosters may be the only ade-

quate remedy. For larger conductors, No. 00 and sometimes No. 2, the overall benefits of capacitors may show them to be better. On some outlying feeders, this consideration may justify unusually large installations of capacitors. On a 4 kv feeder tie five miles in length, for example, 300 kva of capacitors would reduce the voltage drop about 4.8 per cent. Such improvement may bring the voltage within acceptable limits and make a new tie unnecessary.

A certain number of customers to whom continuity of service is important have dual service from either a loop feed or throwover equipment. In some instances, there is a large voltage change when one line is out or when the load is thrown to the emergency feed. Power factor improvement at such loads is frequently very helpful in maintaining good voltage under all conditions.

It occasionally happens that the variation of voltage on a substation bus becomes so great that voltage regulators cannot maintain good voltage at the ends of some of the feeders supplied from that bus, or voltage variation at unregulated customer stations becomes too great. In such cases good economy may be found in the installation of a block of capacitors on a 4 kv substation bus arranged so that they can be cut in and cut out as load or voltage conditions warrant.

A 1,500 kva block of 4 kv capacitors installed on a 6,000 kva, 4 kv, 6 per cent reactance bank supplied from a bus of 1 ohm reactance at 13.2 kv would give a voltage boost of almost 2.5 per cent. Control for cutting in and out could be either manual or automatic, depending on the station at which it was installed. Static capacitors installed at a substation have the advantage of low cost and ease of installation, low losses, quiet operation, low maintenance cost and high salvage value.

Typical Solution

The area chosen for a typical solution is supplied by four 13.2 kv 400,000 c.m. cables from a generating station and two 13.2 kv 0000 copper overhead lines from a major 66 kv substation. A seventh circuit can be used in an emergency. The load is principally industrial and reaches a peak on the six circuits of 18,000 kw and 18,600 rkva during the day. There are three substations supplying 4 kv regulated feeders through transformer banks having a combined capacity of 30,000 kva, which are less than 60 per cent loaded. A number of 13.2 kv lines in the area supply large industrial customers directly. The number of 13.2 kv and 4 kv ties between circuits is entirely adequate for emergency use.

TABLE 1

Feeders	Capacitor kva	Feeder Max.	Rkva Min.	Annual Rkva-hr. x 10^5	Kva & p.f. at 11 A. M. No. Cap.	Kva & p.f. at 11 A. M. With Cap.	Kva & p.f. at 8 P. M. No Cap.	Kva & p.f. at 8 P. M. With Cap.
A ..	540	1,260	240	4.8	1,540-.57	1,140-.77	580	
B ...	405	680	425	4.2	910-.70	675-.93	1,045-.85	900-.99
F ...	405	1,165	295	5.4	1,460-.60	1,164-.75	835-.8	
C ...	405	825	305	4.2	1,125-.68	870-.87	638-.82	
D ..	270	520	290	3.0	780-.75	640-.92	860-.9	780-.99
E ..	270	665	40	2.1	890-.66	710-.83	75	
St. Lights			575				700-.57	
4 kv bank	2,295	5,200	2,175	26.0	6,690-.63	5,260-.8	4,960-.68	3,640-.94
13.2 kv transm.	2,295	5,800	2,400	29.3	7,400-.62	5,870-.78		

	Cable Length Feet (0000)	Feeder Main Feet (00)
A	1,235	12,000
B	680	12,000
F	835	4,200
C	130	5,900
D	3,410	3,000 with concentrated load
E	1,070	4,000

Because of the low power factor of the load, the voltage was lower at both peak load and at light load than in any other area of comparable size on the system. During peak load the voltage sometimes was so low that the available taps on some of the customers' substation banks were not great enough to provide good service. An increase in transmission voltage at all times of the day was necessary. This was particularly true of the 13.2 kv circuits that supplied the substation which was farthest from the principal sources of supply.

This substation is supplied directly from one of the other substations in the area over two 13.2 kv circuits that carry a total load of 7400 kva at 62 per cent power factor. The station feeds six 4 kv feeders with loads as shown in Table 1. The principal problem was one of correcting voltage conditions on the transmission system, since with one exception the 4 kv feeders were not in need of immediate help. It was planned to install capacitors on all feeders in the area, but those listed in Table 1 were installed first because they were at the most remote point on the 13.2 kv system where voltage conditions were poorest and where the greatest line capacity could be released.

New transmission capacity into the area, which would also improve voltage conditions, would cost about $8.35 per kva. Since there was no feasible plan for the use of voltage regulators at the many loads to correct voltage, the new transmission circuit was considered as the only alternative to capacitors. A synchronous condenser would be of much less value than 4 kv capacitors, because it would not help the 4 kv system. All feeders in Table 1 are rated 250 ampere or 1800 kva. All carry a load that is predominantly three phase industrial, except feeder "B," which carries a mixed load, and feeder "D," which is residential and commercial. All except feeder "D" carry loads that are distributed along the feeder main with only short branch lines and to which the curves of Fig. 2, for estimation of saving in feeder copper losses, can be applied with good accuracy. Feeder "D" feeds practically all the load to one point from which it branches in several directions, so that the part on which the large saving is possible is the equivalent of a circuit with all load at the end. On this feeder the capacitors were installed in three phase units close to this load center. The capacitors were installed in single phase units only on feeder "B." All units are rated 135 kva.

The order in which the feeders are listed in Tables 1 and 2 is the order in which capacitors should be installed. Capacity released was not valued as useful capacity unless load growth would make it necessary within four years. It is assumed that this is true of those feeders that carry more than 1200 kva load, or two-thirds of their rated load, which applies only to feeder "A." Feeder "F" has more than 1200 kva load, but it can be readily combined with feeder "E" on one set of 5 per cent buck or boost regulators instead of the present 10 per cent regulators on each feeder. This will not only reduce the load to less than two-thirds of the total circuit rating, but

TABLE 2

	Capacitors Cost $8.75/ kva	Annual Charges 12%	Feeder $11 kva	Annual Return From Capacitors On Feeder 4kv Losses Saved	Bank Losses Saved	Transm. Loss Saved	Trans. $8.35/ kva	Incr. Revenue	Total Annual Returns
A ...	$4,720	$561	$555	$140*	204	$167*	$419		$1,485
B ...	3,540	425		214	128	110*	312	53	817
F ...	3,540	425		150	106	92*	302	15	665
C ...	3,540	425		98	82	75*	292	16	563
D ...	2,360	285		149	43	49*	198		439
E ...	2,360	285		25	32	34*	192		283
Total	$20,060	$2,406	$555	$776	595	$527*	$1,715	84	$4,252

*Half of losses saved.

Total Increase in Capacity and Value in Future When Needed:

	kva Capacity	Value	Annual Return
4 kv feeders	$1,480	$16,280	$1,954
4 kv substation	1,410	15,520	1,861
13.2 kv system	1,715	14,300	1,715
		$46,100	$5,530
Half of losses saved			$1,100

will release one set of regulators as well. For feeder "A," where the increase in capacity is valued as useful capacity, the saving in losses given in the table is the difference in losses obtained with capacitors and that obtained with an equivalent increase in capacity from a new feeder, which is about one-half the saving with capacitors.

All other essential data are taken directly from the curves given in this paper. Table 1 contains data which are not essential to the solution, but which serve to give a better picture of the load before and after capacitors are installed. No attempt is made to correct to a certain final power factor. A comparison of annual charges against the capacitors given in Table 2, column 2, with the expected annual return given in the last column of Table 2, plus their effect in restoring satisfactory transmission voltage, are the only criteria of their value.

The increase in voltage is about 1¼ per cent on the 13.2 kv bus and other capacitor installations planned for the area will bring this to 1.7 per cent. In addition, the 4 kv bank drop was reduced about 1.7 per cent, giving a total voltage increase on the 4 kv bus of 3.4 per cent. This voltage change, combined with a minor change in transmission connections, has made it possible to maintain satisfactory voltage. The 2295 kva of capacitors increased the capacity of the 4 kv feeders by 1480 kva, the 4 kv banks 1410 kva, and the transmission by 1715 kva. Of these, only the transmission capacity and the capacity on one feeder was valued as useful capacity at present. The possible saving in losses from adding more capacitors than are shown in the table is very small. The return from an increase in revenue will always be small and is particularly small here because of the large industrial load. Only a small part of the load used by customers supplied directly from 13.2 kv lines is lighting load and the increase in revenue there is even smaller than on a 4 kv industrial feeder.

The capacitors installed are not the maximum that can be installed, but satisfactory voltage level has been established and the annual return from further additions would be smaller than annual fixed charges. At any time in the future when 4 kv feeder capacity becomes necessary, more fixed capacitors can be installed. If voltage variations on the substation buses become too great, it may be found best to install a block of these units with control for cutting in and out rather than to put them in as fixed units.

Conclusion

The capacitor is a very useful addition to the group of equipments and materials used on an electric distribution system. Its greatest value is that it increases the capacity of circuits carrying reactive load currents. A complete study of the optimum balance between capacitors and new circuit capacity also involves a study of saving in copper losses, improvement in voltage, which may or may not increase revenue, and a consideration of such factors as new emergency tie capacity that may be provided by a new circuit.

The increase in circuit capacity on any part of a power system resulting from capacitors, should not be valued as new capacity unless it will be necessary within a period of several years. There should be some tangible saving or postponement of investment for some definite period of time in any part of the system where increase in capacity is valued as such. Unless this is true, the saving in copper losses and any desirable voltage improvement are the only immediate benefits.

When evaluating saving in losses in the parts of the system where the increase in capacity is evaluated, the saving in losses from circuit additions should also be taken into account. When put on the basis of equal increases in kva or circuit capacity, the increase obtained with a new circuit will save 50 to 60 per cent as much of the losses as that obtained with capacitors. For capacitors connected to a circuit at all times, the saving in losses may be readily estimated from a group of curves without knowing the original losses. The only characteristics of the load that need be known are the rkva-hrs supplied by a circuit and the approximate distribution of the rkva load along that circuit. The saving in losses in a feeder main from three equal capacitor units will be within a few per cent of the saving when capacitors of the same total rating are distributed along the feeder main in the same way as the reactive load.

The possible increase in revenue will be small on a well regulated system. In those extreme cases, where the feeder is so long that regulators cannot maintain acceptable voltage at all points, the increase in voltage to make it satisfactory will be more important than the increase in revenue. Unless some special provision is made for control, a static capacitor has an effect on voltage at any point similar to that of a fixed booster. The fixed boost can usually be obtained with a fixed booster at a much lower cost. Capacitors, however, may be installed in preference to other system additions because they serve several functions whereas the alternative circuit additions serve only one purpose.

A study of some typical areas and loads indicates that the improvement of power factor with fixed capacitors on 4 kv feeders, to an ultimate value of 85 to 95 per cent will be justified. The higher power factor will, in general, apply to outlying residential areas where distances between substations are comparatively great, the load factor of the reactive load is high, and where all of the corrective

kva can be installed on the 4 kv system. The lower power factor will, in general, apply to areas that are predominantly industrial, where the load factor is low and where some power factor improvement may be possible at the large customers' loads that are supplied directly from the transmission system. In some industrial areas some controlled capacitor installations at substations may be desirable.

On a large power system the immediate correction of power factor to these limits would in most cases require a major investment which would not yield an immediate return. If capacitors are added to the power system as load in certain areas makes an increase of capacity necessary, they provide an effective means of adding capacity in small increments. These units will then be paying their way at all times until the optimum economic balance between investment in capacitors and other equipment is reached.

APPENDIX TO MR. RETTIG'S PAPER

Primary Copper Loss in 4325 volt Three-Phase 4-Wire Radial Feeders
(Loss in main feed only)

Loss (watts) = $3KI^2rL$ total in all phases (1)

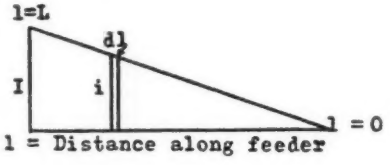
I = Current in amperes per phase in feeder at substation
r = Resistance per phase of unit length of feeder
K = Factor depending on the distribution of load along the feeder
L = Length of feeder

(a) When all load is at end of feeder K = 1

(b) When all load is uniformly distributed along feeder but is rotated so that neutral carries negligible current K = 1/3

(c) When all load is single-phase and is uniformly distributed along feeder and the so-called "phase area" method of voltage regulation with three equal length phase areas is used K = 4/9 for the phase conductors only. If the neutral conductor is equal in size to the phase conductors .17 must be added to the above factor, making K = .613. For multi-grounded neutrals, the neutral resistance may be 1/3 x .17 = .057 and the value then becomes K = .5

Proof of (b)



Loss = $3\int_0^L i^2 r\, dl$ total in all phases $i = \frac{Il}{L}$

$= \frac{3I^2r}{L^2}\int_0^L l^2\, dl = \frac{3I^2r}{L^2}\left[\frac{l^3}{3}\right]_0^L = I^2 r L$ (2)

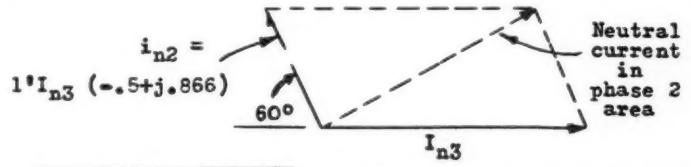
Equating to the right hand side of (1) gives
$3K = 1$ $K = 1/3$

Proof of (c)

Loss (watts in Φ 1) = $1/3\ I^2r\ (1/3\ L)$ (from b)
Loss (watts in Φ 2) = $1/3\ I^2r\ (1/3\ L) + I^2r\ (1/3\ L)$
Loss (watts in Φ 3) = $1/3\ I^2r\ (1/3\ L) + I^2r\ (2/3\ L)$
Total in all phases = $4/3\ I^2rL = 3KI^2rL$
or $3K = 4/3$; $K = 4/9$

In neutral

In phase 1 area loss watts = $1/3\ I^2r\ (1/3\ L)$
In phase 3 area loss watts = $1/3\ I^2r\ (1/3\ L)$
In phase 2 area



$i_{n2} = \sqrt{(I_{n3} - .51' I_{n3})^2 + (.8661' I_{n3})^2}$

Loss in neutral in phase 2 area:

Loss (watts) $= 2\int_0^{\frac{L'}{2}} i^2_{n2}\, r\, dl'$

$= 2\int_0^{\frac{L'}{2}}\left[I^2_{n3} - I^2_{n3}(l') + .25\, I^2_{n3}(l')^2 + .75\, I_{n3}(l')^2\right] r\, dl'$

$= 2\, I^2_{n3}\, r\int_0^{\frac{L}{2}}\left[1 - l + (l')^2\right] dl'$

$= 2\, I^2_{n3}\, r\left[l' - \frac{(l')^2}{2} + \frac{(l')^3}{3}\right]_0^{\frac{L'}{2}}$

$= 2\, I^2_{n3}\, r\, L'\,(1/2 - 1/8 + 1/24)$

$= 5/6\ I^2_{n3}\, rL'$ (3)

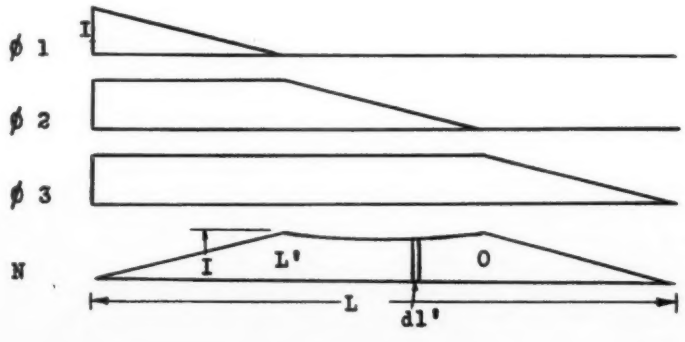
Since $I_{n3} = I$ in magnitude
and $L' = 1/3\ L$

Loss in neutral in phase 2 area
$= .83\ I^2r\ (1/3\ L)$
Loss in neutral in phase 1 and 3 area
$= .67\ I^2r\ (1/3\ L)$
Loss in total neutral = $.50\ I^2rL$ (4)
Loss in total feeder $.50 + 1.33$
$= 1.83\ I^2rL = 3KI^2rL$
$1.83 = 3K$ $K = .61$

The above relationships can be applied independently to the power and reactive components of current and if the relative load distribution along feeder is the same as at all times the following applies:

Annual kwhr loss
$= \frac{8760}{1000} \times$ loss factor $\times$ loss watts

Currents in Conductors



Saving in Copper Losses With Fixed Capacitors

With capacitors in three phase units:

With any three phase power circuit of length L, carrying reactive currents I_{x1}, I_{x2}, and I_{x3} at the end of the feeder on phases 1, 2 and 3 respectively, the saving in losses in watts when a capacitor current I_c is added to each phase is:

$$\begin{aligned}
S_w &= I^2_{x1}\, rL - (I_{x1} - I_c)^2\, rL + I^2_{x2}\, rL \\
&\quad - (I_{x2} - I_c)^2\, rL + I^2_{x3}\, rL - (I_{x3} - I_c)^2\, rL \quad (5)\\
&= I^2_{x1}\, rL - (I^2_{x1} - 2I_{x1}\, I_c + I^2_c)\, rL + I^2_{x2}\, rL \\
&\quad - (I^2_{x2} - 2I_{x2}\, I_c + I^2_c)\, rL + I^2_{x3}\, rL \\
&\quad - (I^2_{x3} - 2I_{x3}\, I_c + I^2_c)\, rL \\
&= rL\,[(2I_{x1}\, I_c - I^2_c) + (2I_{x2}\, I_c - I^2_c) \\
&\quad + (2I_{x3}\, I_c - I^2_c)] \\
&= I_c rL\,[(2I_{x1} - I_c) + (2I_{x2} - I_c) + (2I_{x3} - I_c)] \\
&= I_c rL\,[2(I_{x1} + I_{x2} + I_{x3}) - 3I_c] \quad \text{Watts} \quad (6)
\end{aligned}$$

Or expressed in terms of KVA:

$$\begin{aligned}
S_w &= \frac{KVA_c\, rL}{3\ KV}\left[\frac{2\sqrt{3}}{KV}\,RKVA - \frac{\sqrt{3}\,KVA}{KV}\right] \\
&= \frac{2\,KVA_c\, rL}{KV^2}\left[RKVA - \frac{KVA_c}{2}\right] \text{Watts} \quad (7)
\end{aligned}$$

Where KV is the phase to phase kilovolts of the circuits.

This is independent of the balance of currents on the phases.

When the load factor applied to the reactive load only, that is, the reactive load factor is the same for load on all parts of a feeder. Saving in watt hours per year is

$$S_{wh} = \frac{2.KVA_c\ rl}{KV^2}\left[t_a\ (RKVA_a - \frac{KVA_c}{2}) + t_b\ (RKVA_b - \frac{KVA_c}{2}) + \ldots . \right.$$
$$\left. t_n\ (RKVA_n - \frac{KVA_c}{2})\right]$$

$t_a + t_b + \ldots\ldots + t_n$ = No. of hours per year, or 8760

$$S_{wh} = \frac{2.KVA_c\ rL}{KV^2}\left[RKVA_a\ .t_a + RKVA_b t_b \ldots . + RKVA_n t_n + \frac{8760}{2} KVA_c\right]$$
$$= \frac{2.KVA_c\ rL}{KV^2}\left[RKVA\ H - 4380\ KVA_c\right]$$

Watts hours per year (9)

Where t_a, t_b, and t_n = time in hours per year for each RKVA load

RKVAH = reactive KVA-hrs. per year supplied by feeder

KVA_c = total rating of capacitors in KVA.

As shown in equation (2) the losses in the phases of a feeder with uniformly distributed load are 1/3 of the losses when all the load is at the end of that feeder. Hence, with capacitors distributed the same as the reactive load the saving in loss in either KW (equation 7) or in KWH per year (equation 9) must be only one-third as great. Equation (9) then becomes:

$$S_{wh} = \frac{2\ KVA_c\ rL}{3\ KV^2}\left[RKVAH - 4380\ KVA_c\right] \quad (10)$$

Differenting equation (9) with respect to KVA_c and equating to zero gives:

$$\frac{d\ (S_{wh})}{d\ (KVA_c)} = \frac{2\ rL}{KV^2}\ (RKVA\ H - 8760\ KVA_c) = 0$$

Then for maximum saving in losses:

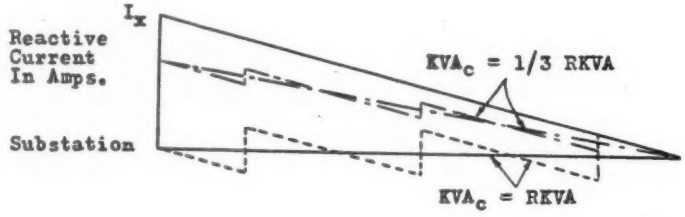
$$(RKVA\ H - 8760\ KVA_c) = 0 \text{ or } RKVA\ H = 8760\ KVA_c \quad (11)$$

The same is true for any type feeder.

Equation (9) was derived for a circuit which carries a single (but not necessarily balanced) load at the end of the feeder. The equation can be applied to a feeder with loads distributed at random on each of the three phases by applying it to a very short length, l, of a feeder within which length the change in load on the conductor is negligible. From this it can readily be shown that a given capacitor unit, whether three-phase or single-phase, will produce a maximum saving in kwhr losses per year, if installed at a point on the feeder where equation (11) applies. Therefore, equation (11) can be used as one guide in determining the best location of a capacitor unit.

Comparison of Saving From Distributed & Block Capacitor Installations With Uniformly Distributed Load

Capacitors located at 1/6, ½ and 5/6 points along feeder main I_x



Applying equation (1) where K = 1/3

Original loss = $1/3\ I^2_x\ rL$ watts per phase

Saving in loss when total KVA_c = RKVA

(a) Capacitors distributed S_w
$= 1/3\ I^2_x\ rL - 0 = 1/3\ I^2_x\ rL$

(b) Capacitors at 1/6, 1/2 and 5/6 points

$$S_w = 1/3\ I^2_x\ rL - 6\ .\ 1/3\ (\frac{I_x}{6})^2\ r\ \frac{L}{6}$$
$$= \frac{35}{108}\ I^2_x\ rL$$

$$\text{Difference} = 1/3 - \frac{35}{108} = 1/36 \text{ or } 2.8\%$$

This is the maximum percentage difference found by checking several values between $KVA_c = 0$ and KVA_c = RKVA.

Feeder With Phase Areas and All Loads Single Phase

On feeders with phase areas the three phase capacitor units were found to produce 73 to 77 per cent as much reduction in losses in the phases as the same KVA in single phase units distributed in the phase areas when the total KVA_c was 50 to 100 per cent. For smaller capacitor additions, the percentage was higher. About 75 per cent is taken as an average which will apply to most installations. Since the losses in the phases of feeders with phase areas is 4/3 times the losses in a rotated feeder with the same load, three 3-phase capacitor units will produce about the same saving in losses in both types of feeders.

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3. Shunt Capacitors on Distribution Circuits, George P. Gamble and Frank M. Starr, *G.E. Review*, October, 1936.

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Council to Evaluate Electrical Inventions for National Defense

A SPECIAL division of the National Inventors Council will be organized shortly to receive, catalogue and evaluate electrical inventions submitted to aid in national defense.

The Council expects to establish permanent offices in the Commerce Department Building in Washington in about six weeks to act as a clearing house for all civilian suggestions for improving defense weapons. A skilled technical staff will be named to consider all submitted inventions and the Council is preparing to handle upward of 100,000 ideas a year. Other divisions of the staff will be established to study inventions in the chemical and mechanical fields.

In addition to receiving civilian ideas, the Council also will accept specific assignments from defense officials and relay these to skilled inventors considered best equipped to find the needed solutions. Dr. William D. Coolidge, director of General Electric Research Laboratories, is the member of the council particularly interested in the electrical field.

Customer Research Pays

By Mrs. Genevieve McCrary
Florida Power Corporation, St. Petersburg, Fla.

A paper presented at the Annual Meeting of the Southeastern Electric Exchange, Roanoke, Va., May 11, 1940

ONE-FOURTH of the residential customers of the Florida Power Corporation live in widely scattered small towns and villages. The low kilowatthour consumption in these communities, as compared with the more congested area, evoked these questions:

Are our customer relations what we think they are?

Are our employees giving a full measure of service?

What can these customers purchase to further utilize our service?

With these questions paramount in mind, I called on all residential customers in ten of the lowest consumption localities.

These calls were made as a service and appliance check-up, the customer's confidence being secured through unhurried conversation, in which I showed a sincere interest in the customer's problems, whatever they might be, and indirectly the desired information was obtained.

Ostensibly nothing was being sold, but intensive suggestive selling of the Company, of appliances and lighting was accomplished. If, in the course of conversation, no questions were asked concerning company operation, policies, rates, government in business or municipal ownership, at least one was adroitly introduced and then more, depending on the customer's interest. Thus, facts were presented without the customer being aware of it. To conduct such interviews the requisites of the interviewer should be Home Service, Lighting and Sales experience and a comprehensive utility background.

Customer research pays returns of two distinct classes—the tangible, or new business, and the intangible, or public regard.

Let us first consider new business or the appliance and prospect findings. We are all more or less familiar with the conventional survey made by salesmen, which undoubtedly has its value, but the fact that the contactor in research work is apparently not selling, affords the opportunity to get intimate information, whereas a salesman usually meets with automatic resistance.

After covering a specified territory, a summary of each individual community is written, giving the economic background and resources, any unusual conditions, appliance saturation and prospects for merchandising, followed by a detail in which customers are classified according to income brackets and occupation, and sub-classified according to the use of major appliances.

The whole territory is then summarized and analyzed, giving general and detailed facts on conditions as found, the type of merchandise which can be sold, the suggested means of selling it and the reasons.

After covering low consumption communities of 522 residential customers, it was decided that one of the higher consumption districts composed of 546 customers be tried, to see what similarity and variation exist.

As to buying power, two out of five were in a financial position to purchase one or more major appliances in the low kilowatthour average territory, while in the higher we found three out of five, which can be attributed to the simple fact that there were more ways of earning a living in the latter. In other words, income in some low-use towns was dependent upon one source, while in the high-use areas the sources were diversified.

This condition is reflected in saturation and prospect percentages and, in order to clearly illustrate this, I have prepared charts giving major appliance saturation and prospects up to 24 months.

After completing the first assignment I was so impressed by the deplorable

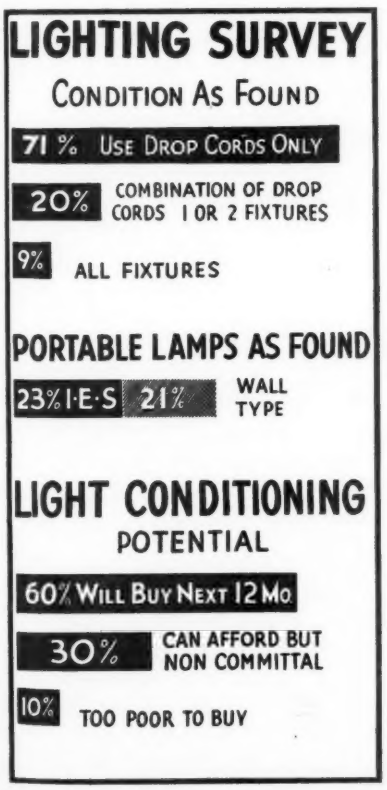

LIGHTING SURVEY
CONDITION AS FOUND
71 % USE DROP CORDS ONLY
20% COMBINATION OF DROP CORDS 1 OR 2 FIXTURES
9% ALL FIXTURES
PORTABLE LAMPS AS FOUND
23% I·E·S 21% WALL TYPE
LIGHT CONDITIONING POTENTIAL
60% WILL BUY NEXT 12 MO.
30% CAN AFFORD BUT NON COMMITTAL
10% TOO POOR TO BUY

Chart 1

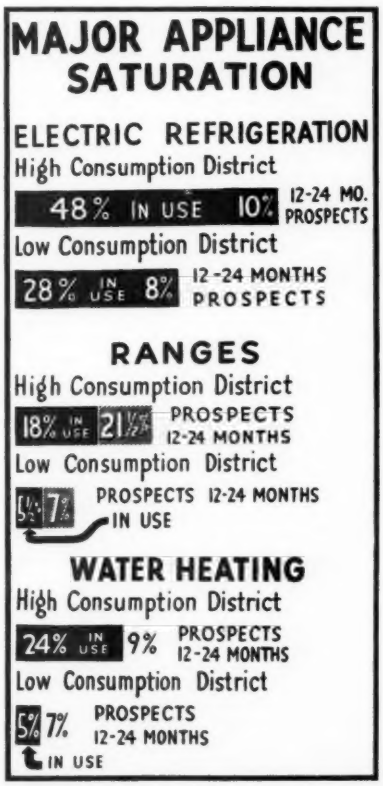

MAJOR APPLIANCE SATURATION
ELECTRIC REFRIGERATION
High Consumption District
48% IN USE 10% 12-24 MO. PROSPECTS
Low Consumption District
28% IN USE 8% 12-24 MONTHS PROSPECTS
RANGES
High Consumption District
18% IN USE 21½% PROSPECTS 12-24 MONTHS
Low Consumption District
5% 7% PROSPECTS 12-24 MONTHS IN USE
WATER HEATING
High Consumption District
24% IN USE 9% PROSPECTS 12-24 MONTHS
Low Consumption District
5% 7% PROSPECTS 12-24 MONTHS IN USE

Chart 2

lighting conditions and the lack of knowledge on what constitutes adequate lighting, that I not only listed the IES lamps but also noted the ceiling lighting. Chart 1 will illustrate conditions as found and indicate our course in combating such conditions.

My observations from one report are as follows:

"The broadest field for new business activity and the most lucrative from a revenue point of view is lighting. I am sorry to say I found a few IES and wall lamps which had never been used because the customer had no convenience outlets. This indicates clearly that some of our efforts, though well-intentioned, have been misdirected. For example, I found a six-way floor lamp over a year old owned by a lady who operates a beauty parlor. The lamp had never been connected and was covered with dust and cobwebs. She was interested in my information on lighting, and we moved the lamp into the beauty parlor where it could be used. I put two 100-watt bulbs in two wall lamps where she had 60-watts, and placed shades on her drop cords, increasing wattage at the same time. When I called back she was delighted and said that her customers had commented favorably on the change.

"I called on another lady who had a pin-to-wall lamp hanging on the wall with no means of connection and black with dust; nor was she using her percolator. I changed the diffuser, 100-watt bulb and shade to a small lamp on a center table, the only light source in the room, and when I called back a few weeks later she was delighted with the improved light, was using her percolator, her bill had gone up 74c, and she was very happy over the change.

"Another customer had an IES Table Study Lamp which she said she didn't like. I asked her why and she answered that it made a 'light just like twilight.' I examined the lamp and found a 25-watt bulb, which I replaced with a 100-watt. The lamp was not purchased from us and she didn't know the size of a single bulb in the house.

"One gentleman asked me why one hundred years ago everyone didn't go blind if good light meant so much. I answered him with this: At that time our country was largely rural. People went to bed early and got up early, so daylight was their chief source of light in reading, and, too, a great many of them couldn't read. They didn't have the books and periodicals that we now have, the ones available were read and re-read until they knew them by heart. And then I asked him why he used a pin-up lamp for his reading, and he replied that it made a better light. This was the only adequate light in his home. He is now interested in improved lighting.

"Good lighting was discussed with every customer. As a starting point we asked where they did their reading, where the children studied, and suggested improvements. Sixty per cent committed themselves to trying one or more adaptors or conversions. Where customers were too poor to buy anything but the bare necessities, we simply recommended a white lined shade from the 10c store over the 100-watt bulb for the time being."

Let me illustrate at this point with one summary to show how data are consolidated and analyzed. Here is my report on an isolated division where a limited amount of promotional work had been done:

"At the time of this economic and appliance survey, the territory surveyed was practically virgin as far as the use of major and small electric appliances, improved lighting, and other conveniences were concerned. This can be attributed to two factors, lack of education as to the benefit and economy of electric service and a large low-income group.

"With few exceptions, the prevalent means of lighting is by drop cord. There are some homes with fixtures and rosettes which are inadequate as to shades and wattage, and better sight lamps are very limited in number and usage. Here lies our real opportunity to build kilowatthour consumption and to regain our rate reduction losses. A concentrated canvass showing the various ways of improving the present lighting, explaining all the reasons for a change, and pointing out that the increase in cost of operation will amount to little, if any, over present billing, due to our voluntary rate reduction, should place a minimum of one unit in nine out of ten homes. In addition, I would recommend movies, practical demonstrations and talks at the public schools, and to any clubs where we have entree. Many customers who did not 'click' on appliance suggestions showed interest in lighting and one hard-boiled customer invited me back to survey and suggest correct lighting for his home.

"Most of these consumers are under the impression that the use of appliances and higher lamp wattage is too expensive and naturally I did what I could to dispel this idea. Many of them have never seen an electric range or water heater, and the interest shown was surprising.

"The low consumption customers in one section depend almost entirely on agriculture to earn a livelihood and the successful farmer here is the exception. However, a nearby district is composed of more prosperous farmers and business people who are usually in a position to buy, unless they experience crop failure, which has a psychological effect whether or not they have the cash.

"Most of this group will be hard to sell because they feel that a penny saved is a penny earned, and economy and better food are, in my mind, the only approaches. Many of them have wood on their farms and negroes in the kitchen, and they are not interested in convenience. I have found that the best way to overcome this resistance is by means of dinner demonstrations, two of which I held in this division, both proving successful. The husbands were invited too, and good food is a powerful argument to men. The reason for inviting and trying to convince the husbands is because of the fact that in these small and rural communities the husband holds the purse strings and, unless he can justify a purchase amounting to one hundred or more dollars, he simply dismisses the desire on the part of his wife for electric equipment as another feminine foible.

"Lighting and refrigeration should serve as the opening wedge in the whole division. There are active sales outlets in the eastern section but they lack skill and aggressiveness. Assistance from us should be given with the view and suggestion to the prospect that this will be only the first purchase, and that it will give some idea of the real value of electric service.

"As to the southwest section of the division, it seems to me that we should carry refrigerators and push them to the limit because it is impossible to sell ranges unless the current in the higher brackets of our rate is used in some way, and a thirty to forty kilowatthour increase with no installation expense attached seems to be desirable. There are no dealers in this section except in one town, and there the customer is not sold but buys if he has convinced himself that he needs an electric refrigerator.

"Although the localities surveyed are in the low consumption group, I feel that we can be of real service to these

customers, as well as to ourselves, within a twelve to twenty-four month period, in both appliances and lighting. It will necessarily involve expense but missionary work always does.

"No income figure can be set as a criterion of purchasing power because in each home conditions vary. The number of children, the managing ability of the home maker, the standard of living in the community, and many other factors prevent setting a specific income as a measure of capacity to buy and operate electric equipment.

"In this particular territory, I believe that most customers can buy and operate a refrigerator on an income of approximately $75.00 a month, and a refrigerator plus a range or water heater on about $100.00 a month, and all three on over $100.00.

"An analysis of each town as to occupation and buying power follows, and the amount of time and expense to be devoted to each can be judged by the buying power reflected there."

Now that report has not been filed away to collect dust. We are again in the refrigerator business in this division, and other recommendations are under way. Active and potential prospect lists are set up, giving the local personnel a select group upon which to concentrate their efforts. They forward a periodic report to the New Business Manager, listing sales and progress made on those not sold. I recently made a spot check and found the reports accurate.

Suggestive selling, first-hand customer information and persistent follow-ups pay new business returns.

Now let's see if we can find something concrete concerning the intangible. We in the industry are so familiar with company policies and operation, rates and kilowatthours, that we have no idea of the almost appalling ignorance and misconceptions of customers. In these outlying territories, the customers' general idea of the company is that it is some big, vague organization with a local representative who can take care of trouble, who reads the meters and collects the bills, and who wants to sell them something every time we have a campaign. In some cases, I had to make it clear that I was not a saleswoman before I was invited into the home. I do not recall a customer who knew more than the first, or the first and second blocks of our residential rate accurately, and a very few knew what a kilowatthour is. Some thought that our rates were set up by us in some arbitrary manner with the purpose of charging them all we thought we could get. It had not occurred to them that each customer represents a definite investment.

Many customers were surprised when asked if they had any complaint and commented on the company's interest in wanting to give a more personal service. When suggestions for improvement of service were requested, they were flattered that we sought their advice. However, they showed no originality in making constructive suggestions. The only general reaction to the question dealt with the elimination of interruptions, which is a problem to all utilities serving rural communities.

There were "various and sundry" complaints, all but a few of which could be handled by the contactor, and these few were referred to the proper source and taken care of. I did everything, from repairing iron cords to giving range demonstrations. The only frequent complaint was the high bill and, unless there were major appliances in the home, which would require a more detailed investigation, the situation was easily handled. For example: The customer had already told me what she used. Let's assume she has an iron, a radio, a pump and typical lighting. We have with us a record of the average consumption of each customer for the past twelve months and we find her bill is averaging $3.00. "Mrs. Jones, your bill averages $3.00 a month, which would be 10c. a day, wouldn't it? Would you deprive yourself and your family of the pleasure of your radio for 10c a day? Would you do without your electric lights for 10c a night? Would you pump and carry water for 10c each day? Would you use the old sad iron for that amount?" The answer is always "No." "Mrs. Jones, if each of these is worth this much to you don't you think that 10c a day is really reasonable for all of them?"

She still has an objection—"Mrs. Smith down the street uses exactly the same things as I do and her bill is always less than mine." Referring to Mrs. Smith's kilowatthour consumption, I agree that her bill is 30c a month, or 1c a day less, and I answer her with a question—"Are your grocery bills exactly the same? Do your cars use identical amounts of gasoline and oil?" I then explain operating costs of whatever she uses and point out that if she doesn't feel she gets value received from every cent she spends with us, we are as unhappy about it as she is. This is tactfully done. The first rule is never to start or win an argument, but appeal to an open mind.

In answering a high rate accusation, I give the customer a simple picture of our operating conditions and then draw a parallel with his line of business. For example, one small town druggist took the first crack at me with the bald statement: "Your rates are too high." He was surprised at my admission that they are higher than in some sections. I said: "Mr. Blank, you sell a certain brand of toothpaste for 50c don't you? Do you know that I can buy that same toothpaste at Walgreen's for 34c?" Rather hesitantly he replied: "I suppose you can." "Now, in your drug store how long do you think you could make a profit, or even stay in business, if you sold at Walgreen's prices?" He had no difficulty in seeing the similarity in our positions.

In contacting another couple, the husband stated that their bill was high, and commented on hearing some of his friends discussing and questioning our rates, especially referring to the high saturation in major appliances in that locality. I asked him if he knew about our rate reduction in November to which he answered, "Yes, but I can't see much difference in my bill." So we figured out his saving which amounted to almost 50c monthly. We discussed what this meant to the company and the effect of increases in manufacturing and construction costs because of the war. I asked another question: "Do you know that a range or water heater must be in service almost two years before we realize any profit on the investment, and that we are rebuilding the local substation at a cost of several thousand dollars to take care of the increased load?" As I was leaving he said he was glad to learn all this and that he had a better understanding of the company.

Another customer, whose husband earns $54 per month to support a large family, made the surprising statement that if electricity were any cheaper we would have to give it away. She told me her neighbor across the road thought her bill was high, so, since that was my next call, I went directly over, found no one at home. But a light had been left burning all morning. I made a special effort to locate this customer who admitted she was careless, laughed about it and said she was satisfied.

(*Continued on page* 401)

Industrial Ads Create Goodwill for Utility

AN effective instrument of good will has been developed by the Rockland Light and Power Company, of Nyack, New York, in a program of "Know Your Community" advertising in newspapers, presenting interesting facts about industries in the territory served by the utility company. Begun in November, 1939, the campaign has received an impressive amount of favorable comment, both from the business enterprises thus publicized and from disinterested readers.

A separate series of ads was run in the newspaper of each community in the territory. Each ad, about 1/3-page in size, is devoted to the story of one important business in the particular community: its history, management, product or service, method of operation and its place in community life.

Many of these industrial stories have strong human appeal, especially in those cases where the founder of the enterprise was an industrial pioneer or overcame obstacles in establishing and developing his business. A shirt manufacturer began in a loft over a drug store in 1874, "farming out" much of the work among families in the community; now his plant employs an average of 170 persons and pays $170,000 a year in wages. A creamery was induced to locate in one town through the drilling of an artesian well by farmers living nearby. Chambers of Commerce and civic minded citizens (always mentioned by name in the ads) often aided in the financing of new industries. Civic pride is further stimulated by pointing out the importance nationally of a locally made product; for instance, a trap-rock company is the largest of its kind.

In every ad emphasis is given the social and economic contributions made by the industry to community welfare through employment, payment of wages and taxes, good labor relations, employee benefit programs, home ownership among employees, etc. The theme throughout is that business, in particular and in general, is a vital factor in the daily living of everyone in the community.

Continuity of reader interest is obtained by using the general title, "Know Your Community," numbering the ads from one up in each series and announcing that other similar ads will appear soon. This information appears at the lower left corner of the ad in a small box, which also contains the only mention of the utility company. This is a simple statement that Rockland Light and Power Company is sponsoring the series as a contribution toward better understanding of local industrial activities and in most instances adds *that the company supplies the industry described with electric power.*

Industries and institutions described have included a railroad, a hospital, a biological laboratory, a dairy, a laundry, a stone quarry, a fur processing works and plants manufacturing ice, underwear, folding machines, heavy industrial machinery, briar pipes, brick, saws, pocketbooks, shoes, shirts, silk cloth, rayon cloth, silverware and women's coats and suits.

Results of the campaign, though necessarily indirect to some extent, have been gratifying to the Rockland Light and Power Company, according to Mr. F. L. Lovett, vice-president and general manager. The company now plans to reproduce the stories in pamphlet form to give to persons who might be interested to know something about the customers which the company serves.

Comments made by industrial customers whose businesses have been advertised through the program are indicative of the general reaction:

"I was deeply impressed, not only by this article, but also by those which appeared in former issues of the local paper. It shows that your corporation is vitally interested in all community activities."

"The commendatory expressions are certainly bound to react in the minds of the public to the benefit of the Erie and other common carriers."

"This movement on the part of Rockland Light and Power Company received much fine comment and I am sure that the general and industrial public will realize to a greater degree that our public service organizations are truly a part of our local civic set-up."

ROCKLAND BRICK CO., INC.

Haverstraw was at one time the brickmaking center of the World. It led all others in the quantity and quality of its product. One of the factors which gave Haverstraw its pre-eminence in the brick industry was and is the character of the clay available for manufacturing. A good building brick will contain about fifty percent silica, twenty five percent alumina and oxide of iron, three percent carbonate of lime, one percent carbonate of magnesium and twenty-one percent of water and other constituents. Mechanically the manufacture of brick is not a complicated process. The trick in producing an article of superior quality is in the handling of the natural material, the proper baking in the kiln and so on. And that is a matter of long experience and expertness in the business.

Carries on Haverstraw Tradition

The Rockland Brick Company, Inc., with a production running up to twenty-seven million bricks a year is carrying on the Haverstraw tradition. It was in the yard operated by this company that the first brick were made in New York State in the year 1803. One of the firm's recent jobs was supplying the brick for a Yonkers slum clearance project comprising the construction of forty low-cost apartments. The brick are shipped by truck direct from the yard to the job. This makes for economy in handling and helps to enable the company to supply a high grade brick at an attractive price.

Brickmaking Thousands of Years Ago

Brickmaking is an ancient industry. The earliest brickmaking of which there are remains was doubtless carried on by the Babylonians and Egyptians in the grain producing valleys of the Euphrates and the Nile. Both timber and stone were lacking there and sun-dried bricks more than four thousand years old have been found in the ruins of old cities in a state of excellent preservation. Brickmaking is mentioned in the Bible and the first chapter of Exodus tells how the Egyptians made the lives of their slaves "bitter in bondage with water and with brick."

For some reason or other the humorists have always found humor in a brick. A common expression is "I feel as though I had been hit with a brick." The brick has long been considered an offensive weapon of great potency and any man who has ever been hit with one can bear witness to the accuracy of the notion.

English King Set Standard Size

The old Romans were an efficient people and wherever they went they left evidence of their enterprise and ingenuity. They made brick for building purposes in England as early as A. D. 44. The Anglo-Saxons, under King Arthur, he of the Round Table, manufactured brick in 886 A. D. and the industry flourished in Great Britain in the sixteenth and seventeenth centuries. King Charles, the first,—evidently an efficiency expert —set a standard size for brick to be used throughout the country. This was in the year 1625.

Well-Managed and Substantial

It was later by less than one hundred years—in 1702—to be exact that the section of Rockland County now occupied by the Rockland Brick Co., Inc., was occupied by colonial settlers and the village of Haverstraw had its beginnings. And it was only a little over a century afterward the first brick were made there.

Rockland Brick Company is a well-managed and substantial concern. Its property covers about thirty acres and its plant is equipped for economy and speed in production. It employs about seventy-five men and has an annual payroll of between eighty-five and ninety thousand dollars. That's a tidy sum in anybody's money. Employes are unionized and affiliated with the American Federation of Labor. The firm's labor policy is liberal and progressive. Work is steady for about ten and one-half months during the year. As a member of the county's industrial family the Rockland Brick Co., Inc., is providing work and wages. It buys supplies locally wherever possible and that means spreading more work and wages through others. Work and wages are something the county and the country need.

KNOW YOUR COMMUNITY

No. 10

This is the tenth of a series of advertisements about Rockland County industries.

It is a contribution by the Rockland Light and Power Company toward a better understanding of the county's industrial set-up.

The Rockland Brick Co., Inc., is served by the Rockland Light and Power Company.

Another advertisement covering another Rockland County industry will appear in an early issue of The Journal-News.

One of the Rockland Company's industrial ads

We Believed It Then—We Know It Now

By L. A. S. Wood

Chief Lighting Engineer, Westinghouse Electric and Manufacturing Company

THE annual reports of the old N.E.L.A. Street and Highway Lighting Committee contain many excellent suggestions in respect to the development of the street lighting load and indicate a growing recognition that street lighting is a salable commodity to be actively promoted by the utility companies.

Let us "look at the record," and bring it up to date:

1921—"The real development in street lighting will come only when the Central Stations themselves advocate these improvements. . . ."

1922—"If the municipal demand (for street lighting) and the Central Station ability can be coordinated, there is before us a tremendous prospect for more and better street lighting."

"Street lighting should not be looked upon as a political football. . . . It is a civic improvement affording the Central Station an opportunity for meeting municipal officials on a common ground, and should be the means of developing cordial relations between the Central Station and the municipality."

1924—"Increase in traffic accidents and crime have caused an increasing and insistent demand for improved street illumination. Recognize the opportunity and meet it."

1925—"The load factor and kilowatt consumption of street lighting are high; street lighting is or can be made desirable new business."

"Adequate street lighting means increased cost to the city. It is worth the expenditure. Do not merely contract for street lighting; sell it at a price which will insure a fair return."

1927—For the effective merchandising of street lighting service, we must:

(1) "REALIZE:

(a) "That street lighting is a salable commodity.

(b) "That the public interest requires illumination many times greater than the present values and that its attainment justifies public expenditures at least twice the present average."

(2) "ORGANIZE

(a) "By making the Commercial Department responsible for the sale of street lighting service.

(b) "By building up in the Commercial Department a lighting service division equipped to render up-to-the minute service on street lighting problems.

(c) "By selling the advantages of the street lighting load and its value as a 'good-will' builder to all Central Station employees and by keeping street lighting before them at all times.

(d) "By thoroughly surveying the possibilities for street lighting development separately and in detail for each community served; this survey to include the determination of the individuals in each community best able to combine an ability for civic leadership with an unselfish interest in civic advancement."

(3) "ASSUME LEADERSHIP

(a) "By demonstrating the desirability of each community adopting a competently engineered 'ultimate' plan definitely establishing all physical elements of a street lighting system which will provide adequate street lighting service.

(b) "By keeping the subject of street lighting before civic societies, business men's clubs, chambers of commerce, safety organizations and women's clubs.

(c) "By selling the advantages of good street lighting to the newspapers *and keeping them sold.*

(d) "By advertising the value of good street lighting in the newspapers.

(e) "By using appropriate window displays, exhibits and signs advertising improved street lighting.

(f) "By compiling data showing the effects of good and poor street lighting in local communities and elsewhere."

"Street lighting is one of the most important functions of the electric service company, and should be a cooperative arrangement on the part of the community and the public service company whereby a sensibly zoned system of street illumination is made available for promoting the safety, prosperity, and comfort of the citizens."

1930-1939—The "blackout" in street lighting; continued increase in night traffic accidents and a growing public realization that adequate night visibility is essential to night traffic safety.

The Renaissance

1939—At the Street Lighting Sales Conference of the Pennsylvania Electric Association, Mr. H. S. Metcalf, Public Relations Director of the West Penn Power Company, said:

"The development of every market for electric service has followed a regular pattern and that it has been successful is attested by the tremendous increase in the number of electrical appliances and the tremendous gain in the use of electricity in the industrial, commercial, residential and rural markets."

"Now we are at the doorstep of opportunity in the development of the Municipal Sales Market. The same pattern of telling the advantages may be followed with reasonable assurance of similar sales results.

"The regular pattern of promotion for street lighting is beginning to arrive at the same status as our promotion of residential, commercial, industrial, and rural classifications, and this is by far the soundest approach to our problem. For when the public wants to know and they do find out, they will want to have something done about it. The public in the last analysis is always the boss, and municipal authorities must meet the demands of an enlightened citizenry.

"Yes, our public's dormant interest in public lighting can be aroused. Our job is to keep it rolling . . . to get it rolling faster through continuous efforts on all fronts."

1940—The following is quoted from a paper entitled "Traffic Safety Lighting —An Opportunity for Public Service" which was presented before the Second Annual Street Lighting Sales Conference of the Pennsylvania Electric Association:

"From a high of 2,330,000,000 kwhrs in 1931, the energy consumed in street lighting has, with the exception of 1935, 1936, and 1938, gone down each year until 1939, when it hit 1,830,000,000 kwhrs, the lowest since 1927." (*Electrical World*, February 10, 1940.)

"This decrease in energy consumption reflects ill-advised reductions in municipal street lighting budgets and not improvements in the efficiency of light sources.

"Of all important municipal expenditures, street lighting has advanced less than any other service. Since 1931, under the mistaken belief that money can be saved by curtailing street lighting service, expenditures have actually decreased 17½ percent. (This reflects the reductions during the same period in energy consumed in street lighting service.)

"Night traffic safety cannot be attained at the cost of the 'distributed

Just Street Lighting

darkness' of prevailing street lighting systems and the final step in any program of light conditioning must be the development of a public appreciation of the value of adequate night visibility in traffic accident prevention and the necessity for adequate municipal appropriations for the purpose.

"In recognition of its major purpose —safety, modern street lighting is popularly known as 'Traffic Safety Lighting' and for the first time in its history the electric light and power industry is in a position to promote this humanitarian service without fear of exposing itself to charges of commercialism.

"The electric service companies are in a favorable position to afford leadership in matters of street lighting and the assumption of such leadership should not only lead to improvements in the night traffic accident situation but should also tend towards improved public relations.

"However, civic leadership in the solution of the night traffic accident problem and the development of the growing market for traffic safety lighting, will require a thorough understanding of the revolutionary changes that have taken place in street lighting practice. The problem can no longer be viewed through pre-depression glasses or even through the 1935 models, and the time is at hand when the power industry must reorientate itself in respect to street lighting or miss completely an exceptional opportunity for public service.

"If an aroused public interest in night traffic safety is to mean anything to the utility companies, the public must be kept informed as to the value of adequate night visibility in the prevention of

Traffic Safety Lighting

traffic accidents. . . . The story must reach the ultimate customer—the people who will be benefited and who in the final analysis also pay the bills—the general public.

"The market for traffic Safety Lighting (within urban limits) lies in thoroughfares, boulevards, and local streets in residence and warehouse districts where most of the accidents occur. Much of the lighting on these streets was designed in the horse and buggy days and while sufficient for traffic conditions of that era, is inadequate to cope with modern road transportation with its rapidly increasing density and high speeds.

"Lacking the commercial appeal of business districts and financed out of limited municipal street lighting budgets, the lighting of these streets has been neglected and there has been little effort on the part of the utilities to enlighten the public regarding their fatal character. This market is of paramount importance embracing as it does nearly 80 per cent of all urban street mileage, and because of many years of neglect, offers unlimited opportunities for development. It is a live market and because of public interest in traffic safety, it possesses an unusual appeal with immediate prospects of public acceptance.

"Traffic safety lighting is new and prospects exist everywhere. Active promotion should be directed to these prospects *now*, regardless of contract expiration dates or other local conditions. A new contract for traffic safety lighting with a satisfied customer, even though new lighting equipment is involved, may be found more advantageous than an old contract and a dissatisfied customer.

"Traffic safety lighting is not 'just street lighting.' Traffic safety lighting is based on sound scientific principles and is designed to provide for the automobile driver rapidly approaching a hazard, a visibility distance sufficient to permit sure and certain seeing in time for the driver to take the necessary precautions to avoid an accident.

"Thus an old and neglected market is reopened for modernization programs. The approach is safety—safety through adequate visibility and this approach removes many difficulties previously experienced in negotiating street lighting contracts. It has taken street lighting out of the realm of politics and placed it on a high plane of service. Today traffic safety lighting is promoted to insure night traffic safety and not to enhance property values or for other commercial reasons.

"This approach minimizes many difficulties hitherto experienced in financing street lighting service. Funds are generously appropriated for all kinds of safety measures and the public is beginning to realize that traffic safety lighting provides a safety factor without which all other safety measures are partially nullified at night.

"Since the approach to traffic safety lighting is safety through adequate visibility, a sound basis on which promotional activities may be built will be found in the day and night traffic accident and fatality records."

Conclusion

In the decade from 1920 to 1930, *we believed* that street lighting was a salable commodity. *We know now* that traffic safety lighting if aggressively promoted under the able leadership of the Electric Light and Power Industry, will bring large returns in greater public safety, improved public relations and increased revenues.

Customer Research Pays

(*Continued from page* 397)

Such calls give us an opportunity to find out the true reasons for such complaints, which would be impossible in an office contact.

This research also unquestionably revealed that district employees, through their proximity to local conditions, were sometimes blind to their significance. For example, one district manager, who is absolutely tops in his field, had allowed a bad minor operating condition in one small town under his supervision to run on until all the customers in the town commented about it, and a few were somewhat antagonistic. He had reported the condition to his immediate superior but no action had been taken. When the subject was broached to the two of them the district manager said he had reported it and the division manager said there was no excuse for any such condition to exist. The matter is now in hand. Here we have one of our best district managers whose public relations and merchandising ability are outstanding, but who failed to see the effect of the foregoing because he was too close to it. A few minor incidents were found, called to his attention and taken care of. In themselves they were unimportant but a few rotten apples in a barrel, if left there, will soon contaminate the good ones.

Upon my return, after being out of the territory for eight months, one of our district managers volunteered the statement that he had found his customers easier to deal with since my canvass. I asked another district man if he could see any difference and he replied that he didn't. There was evidence to the contrary which he had accepted without recognizing it. He had sold 20 lighting units in one town which I had covered and which he had thought was hopeless. When I surveyed the small town where he lives, there were but three ranges, and his wife was using her oil stove to a large extent because they thought their electric range was too expensive to operate. When I made my third call I found a lady who had placed a $66 order for a super-special brand of aluminum ware with an agent, who was selling it through dinner demonstrations. I aroused a question mark in her mind, arranged for an electric dinner demonstration at the school house and served 40 people. One range sale was clinched there and this lady bought one subsequently. The district operator's wife is now using her electric range, and he very proudly told me that he is going to sell four ranges this season. This and similar incidents surely point toward a better employee educational program.

Without doubt this activity is of material assistance in shaping and carrying out our merchandising programs. Giving a definite outline to the hazy picture customers have of a utility counteracts misunderstanding and builds good will. The nature of these contacts invites confidence and thereby serves as a check on the service which employees render.

Customer research cannot be prescribed as a magic formula, but it is certainly a good tonic for new business; it is definitely full of public relations vitamins; it is a stimulant to employees to give a better and more complete service, and it is frequently an eye-opener to the executives.

Plan Extensive Advertising

Sales of IES lamps, already more than 80 per cent above the same period of 1939, are expected to go ahead even more rapidly this fall when IES lamp and shade makers swing into the largest newspaper campaign, from the standpoint of coverage, in their history. In this campaign, newspapers serving 87 of the most important marketing areas of the country will be used—newspapers whose combined circulation is nearly 12,000,000.

Air Conditioning Load Exceeds 1,000,000 Kilowatts

AIR conditioning was responsible for approximately 1,045,000 kw of the connected electric load in the United States on Dec. 31, 1939. This is indicated by an extension of the figures listed in the second statistical report of the Air Conditioning Committee of the Edison Electric Institute.[1] The report lists the various types of air conditioning installations of 183 operating utility companies, serving slightly less than two-thirds of the total number of electric light and power customers. The extension to 100 per cent of the business shows the connected air conditioning load (hp converted to kw) at the end of the year applied as follows:

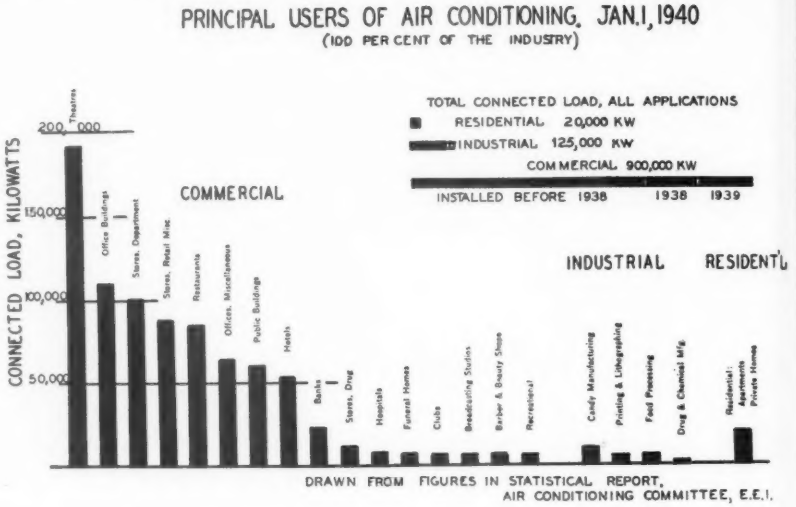
Application	Number of Installations	Kw Connected
Residential	15,000	20,000
Commercial	46,000	900,000
Industrial	5,000	125,000
Totals	66,000	1,045,000

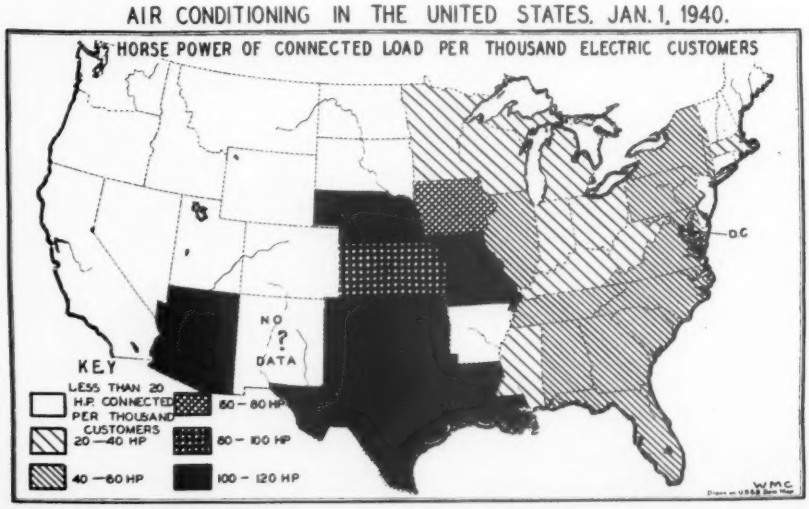
About 745,000 kw of the total was installed prior to 1938, and 150,000 kw was installed during each of the years 1938 and 1939. The largest individual load classification is that of theatres, of which about 3000 were air conditioned, with a total connected load of approximately 195,000 kw. The relative importance of the principal applications is shown on the adjoining chart.

The chart below, indicating the horsepower of air-conditioning load per thousand electric customers, also has been made from the data contained in the report on the assumption that the total of the companies reporting in each state was typical of the entire state. In one state (New Mexico) there was insufficient data to arrive at a state-wide figure. It will be observed that, as a generality, the degree of air conditioning depends upon a combination of temperature and urban development.

The tabulation in the adjoining column summarizes the air conditioning installations reported by the 183 companies only.

[1] Edison Electric Institute, $1. per copy.





EDISON ELECTRIC INSTITUTE

Air Conditioning Installations

183 Companies, 18,800,000 Meters

Application	No.	*HP
Residential:		
Apartments and Private Homes	9664	17,348.90
Commercial:		
Apartments	82	2,466.65
Banks	526	19,777.80
Barber & Beauty Shops ..	645	4,205.98
Broadcasting Studios	156	4,825.80
Clubs	268	5,039.07
Funeral Homes	683	6,353.73
Hospitals	420	6,684.18
Hotels	1087	45,644.31
Office Buildings	974	96,054.02
Offices, Doctors & Dentists	1360	3,193.26
Offices, Miscellaneous ...	8308	55,536.72
Public Buildings	363	51,603.10
Recreational	142	3,007.76
Restaurants	4518	73,255.17
Stores, Department	806	87,899.64
Stores, Drug	785	9,406.96
Stores, Retail Misc.	4889	76,658.57
Theatres	1942	167,280.92
Other Commercial	1861	29,373.19
Industrial:		
Candy Manufacturing ..	181	10,009.92
Drug & Chemical Mfg. .	60	2,949.80
Printing & Lithographing.	112	6,848.96
Textile Manufacturing ..	43	2,287.00
Tobacco Manufacturing .	27	1,500.45
Metal Working	9	325.00
Food Processing	268	6,035.54
Fur Storage	120	637.61
Other Industrial	2190	74,472.94
	**115	2,341.15
Total Installations 42604		873,024.08
Installations included above that use power other than central station electric	263	8,799.21
Self Contained conditioners included above:		
1½ HP or less (Room Coolers) 10786		7,645.13
2 HP or larger (Store Units)	2689	13,297.59

*HP includes all auxiliaries.
**Totals only—no segregation statistics submitted.

The Time to Win 1941 Prizes is Now

POSTERS headlined "Prizes and Awards" will soon go up on the bulletin boards of public utility operating companies throughout the United States and thousands of circulars devoted to the same subject will be distributed among the employees of these companies. The prizes and awards thus announced constitute the electric light and power industry's recognition of outstanding achievements in electric service by companies and individuals. Contributed by various donors, they are administered by the Edison Electric Institute through its Prize Awards Committee.

The competitions for all the awards are open to all electric light and power companies in the United States and their employees, without regard to membership in the Institute. Winners will be announced and awards presented at the Institute's 1941 convention.

The convention is still nine months away (June) but, since most of the awards are for total accomplishments over the year 1940, the competition is very much "on" now. Companies and individuals should be checking up the progress they have made thus far and laying plans for the decisive push toward the goal in the imminent fall and winter seasons. Organized effort may well bring many records up to competition level within the remaining months.

In all, 33 prizes are to be awarded at the convention, 11 to electric utility companies and 22 to individuals. The cash prizes total $5,250 and there are two trophies, two plaques, seven certificates of recognition and three citations to be won. Some of the awards are long-established; others, reflecting new or added emphasis on certain activities of the industry, are of comparatively recent origin.

The Laura McCall Award

The newest is the Laura McCall Award, established this year by *McCall's Magazine* in memory of its founder. It honors the achievements of Home Service departments of electric utility companies in the advancement of electrical living in the home through promotion of electrical appliances and home lighting equipment. The company presenting the best Home Service department record for 1940 within the terms of the award will receive an engraved plaque. Companies placing second and third will receive illuminated parchments. Three cash prizes, $100, $50 and $25, will go to the Home Service directors or directing heads of the Home Service departments reporting the winning achievements. Presentations for the Laura McCall Award must be forwarded to the Secretary, Edison Electric Institute, by April 1, 1941.

The Claude L. Matthews Awards

A tradition of the industry—that its employees maintain electric service to the public under all conditions, often at great personal risk—is recognized in the Claude L. Matthews Awards For Valor. Three cash awards of $150 each, accompanied by citations and lapel decorations, are offered for the year 1940 by Mr. Claude L. Matthews, vice-president, W. N. Matthews Corporation, for "acts of devotion to duty by public utility employees wherein outstanding courage has been shown in efforts to maintain important electric service or to restore service in the shortest possible time."

Storms, floods and accidents are frequent enough to keep the tradition of valor very much alive in actual practice, but apparently many companies are too modest, or regard the heroic acts of their employees too much as a matter of routine, to report them for national recognition. No recommendations for the year 1939 were received by the Prize Awards Committee and consequently no Matthews awards were made at the 1940 convention.

Mr. H. P. Liversidge, committee chairman, commented: "There must have been many instances in the past year when men, without thought of danger to themselves, gave all they could to prevent service from being disrupted, or if it was interrupted, at risk of life and limb restored in the shortest possible time."

This year the committee is urging that all courageous acts in maintaining or restoring electric service be recommended for the award and that such recommendation be forwarded soon after the occurrence of the act. Recommendation must be made by the president or acting executive head of the utility company employing the person cited.

The Forbes Prize
The McGraw Prizes

Two of the awards to individuals are for papers on subjects important to the industry. The Forbes Prize, donated by Mr. B. C. Forbes, editor, *Forbes Magazine*, is a cash award of $250 for the most meritorious paper submitted on the subject of public relations in the electric light and power industry.

For the three best competing papers on technical or engineering subjects relating to the industry, three cash prizes of $250, $150 and $100, known as the McGraw prizes, are offered by Mr. James H. McGraw, honorary chairman, McGraw-Hill Publishing Company.

Any person employed by an electric light and power company is eligible to compete for the Forbes Prize and the McGraw Prizes. Papers must be submitted, in duplicate, by March 1, 1941. Complete rules and conditions governing the contests are contained in the circulars to be distributed to employees, or may be obtained from the Secretary of the Institute.

The R. B. Marshall Award

Electric range salesmen representing utility companies may compete for the R. B. Marshall Award, donated by Mr. R. B. Marshall, president, Electromaster, Incorporated. Five cash prizes of $100 each are offered to the representatives in five classifications, according to the number of customers served by the companies, who sell, lease or rent during 1940 the greatest number of individual domestic electric ranges of a rated capacity of 5 kw or more. Statements substantiating entries for the award must be forwarded, in duplicate, by March 1, 1941.

The George A. Hughes Award

Company achievements in the development of the electric range market, through direct or cooperative promotion or selling, or both, during 1940 are recognized by the George A. Hughes Award, which also provides cash prizes for the individuals responsible for the

achievements. Established by Mr. George A. Hughes, chairman, Edison General Electric Appliance Company, this award consists of a trophy for the company winning first place, certificates of recognition for the companies placing second and third, and cash prizes of $500, $300 and $200 for the individuals responsible. Presentations of accomplishments must be forwarded to the Institute by April 1, 1941.

The Augustus D. Curtis Award

Keeping pace with developments in the art of illumination, the requirements for the Augustus D. Curtis Award have been broadened this year to include applications of the newest commercial light source, the fluorescent lamp. This award, which is another including prizes for individuals, is offered by Messrs. Darwin and Kenneth Curtis in memory of Augustus D. Curtis for distinguished contributions by public utility companies to the advancement of higher levels of illumination in the interiors of commercial buildings. The installations entered in the competition, involving either completely new lighting or general relighting of commercial interiors, may under the new conditions be either fluorescent, incandescent, or a combination of the two. The companies winning first and second places will receive certificates, with cash prizes of $200 and $100 going to the individuals responsible for the achievements. Third and fourth prizes will be $50 and $25 to the individuals responsible for the achievements placing in that order. The contest period is the 12 months ending March 1, 1941, and presentations must be forwarded by April 1.

The Thomas W. Martin Award

Outstanding progress in rural electrification will receive recognition in the Thomas W. Martin Award, donated by Mr. Thomas W. Martin, president, Alabama Power Company. This is a bronze plaque to be presented to the public utility operating company which during the year 1940 has shown the greatest contribution to agricultural advancement within its territory through promotion of uses of electricity, development of rural load, cooperation with other agencies, extension of rural lines and organization and planning for development of rural electrification.

The Charles A. Coffin Award

The Charles A. Coffin Award, sponsored by General Electric Company, is the "big" prize of the industry in the sense that it is given for over-all advancement in operations and physical plant by a public utility operating company during 1940, constituting a distinguished contribution to the development of electric light and power for the convenience of the public and the benefit of the industry. The winning company will receive a gold medal, known as the Charles A. Coffin Medal, and $1,000 for its employees' benefit or similar fund. Sixteen companies have won the award since its establishment in 1922.

The National Electric Water Heating Award

Another $1,000 in cash prizes makes up the Modern Kitchen Bureau's National Electric Water Heating Award for the best all around promotion and sales of electric water heaters by public utility operating companies during 1940. The three winning companies are determined on a point basis which takes into account the number of customers served. The prizes are $500, $300 and $200.

Mr. H. P. Liversidge, president, Philadelphia Electric Company, is chairman of the Prize Awards Committee. Members are Mr. James E. Davidson, president, Nebraska Power Company, and Mr. Charles W. Kellogg, president, Edison Electric Institute, and the secretary is Mr. Lewis B. Beatty, Philadelphia Electric Company. Judging of the entries competing for each award is done by men selected by the committee for their expert knowledge in the particular field concerned.

Details of any of these awards may be obtained from the Secretary, Edison Electric Institute, 420 Lexington Avenue, New York, N. Y.

Moving Pictures to Show Method Used in Determining Observed Depreciation

THE goal of any utility company in a rate case is, of course, to win the case. The man or men who have the power of decision—commission or court—must be convinced of the justness of the company's contentions; and this can be accomplished only if these men *understand* what the company endeavors to say. Without such understanding, the most comprehensive presentation of evidence will be largely ineffective.

Yet the difficulties that attend the translation of engineering lore into legal language are, to say the least, tremendous and probably no utility counsel has ever been completely satisfied on this score. Many of the words and phrases used by witnesses on depreciation simply carry no meaning to a layman, however rounded out his legal education may be. If counsel is alert he will have his experts constantly explain—in the simplest words possible—the meaning of technical terms, no matter how familar they may be to the craft.(1) But even the most thorough explanation cannot take the place of visual knowledge. It must also be kept in mind that the higher the case goes in the progression of appeals—which means, the more important it is—the less time usually can be devoted to it by the appellate tribunal or even the particular member assigned to write the opinion.

How can the situation be improved? According to the newspapers, a new slant was tried recently when Frederic Ballard, counsel for the American Gas & Electric system, climaxed the presentation of its integration case before the SEC with a moving picture "complete with a sound track commentary" as the final exhibit in the company's attempt to prove that its properties constituted on the whole the interconnected and coordinated operating utility system which the holding company act requires. While the film was not formally offered in evidence, pending determination of its acceptability, we read that the "entire hearing, from trial examiner to audience, adjourned into an adjoining room to view this unusual presentation of evidence."

The adaptability of this method of

(*Continued on page* 414)

(1) Two excellent illustrations of what we mean are taken from the record of the Queens Borough Gas & Electric Co. case (New York Public Service Commission, Case No. 8403). There the witness testified that he examined the combustion chamber linings and found the whole setting to be in good condition except for a few minor spots. Counsel then continued:

Q. Those combustion chamber linings are just tile linings, aren't they?
A. Yes, sir.
Q. And what you are saying now is that it is necessary to put in a few tiles?
A. That is right.

At another hearing of this case a witness described the property grouped under Account 332, overhead conductors as "transmission, both bare and insulated, distribution, street lighting and secondary conductors." Counsel made him explain:

Q. When you say that you mean, in ordinary terms, wires?
A. Yes, wires.
Q. What do the underground conductors consist of—account No. 333?
A. Transmission and distribution and street lighting.
Q. That is, in this case they are cables?
A. Cables.

Farm Press Day—Luncheon at the Electrified Farm

The Electrified Farm Is Center of Interest During Farm Week at the World's Fair

THE Electrified Farm has been one of the "hit" exhibits of the New York World's Fair since opening day, 1939, but its real heyday came during the week of August 12-18, 1940, which was Farm Week at the Fair. Interest of the rural visitors naturally centered at the Farm, and officials of the Electric Utilities Exhibit Corporation, operators of the exhibit, estimated that attendance rose more than 50 per cent over previous weeks. Normally the Electrified Farm attracts one-sixth to one-fifth of the Fair's total "gate."

Headquarters of the National Grange, farmers' national association, were established at the Farm exhibit for the week and the "loft" of the dairy barn—actually a spacious, comfortably furnished lounge—was turned over to the Grange. Exhibit employees handled the association's registration and the Farm's Personal Service Bureau was busy all week helping Grangers find missing friends, keep appointments and arrange sightseeing around the Fair and New York. The folks from America's farms appreciated the friendliness that was manifest in this service and they were impressed with the fact that these courtesies were made possible by their home-town electric light and power companies.

Even before National Farm Organization Day, which was Friday, August 16, the Grange registration reflected attendance from virtually every part of the country, including both Maine and California, with a heavy representation from the Middle West.

Monday, August 12, was Farm Press Day. Editors and publishers of leading farm publications, with their families, were welcomed by Mr. Clayton Irwin, managing director of the electric utilities' exhibits, who conducted them on a tour of the Farm. The editors seemed even more interested than the average visitor in the more than 100 farm uses of electricity that are demonstrated in the various buildings of the exhibit. Several of the editors took advantage of the opportunity to interview the young agricultural college graduates who have charge of the demonstrations.

All the applications attract comment and genuinely interested inquiries from visitors, but the quick-freezing apparatus ranks especially high in "news" value. Often it takes a little time to clarify a visitor's mistaken belief that the equipment is connected either with the cold-storage lockers which farmers in some areas can rent at central points or with the frozen foods sold in stores. Once he understands that he can freeze and store right on his own farm, interest goes up a hundred per cent and the questions come thick and fast.

The women are immediately impressed with the ease of operation of the freezing and storing processes—it's so much easier than canning, they say. Men, oddly enough, are apt to ask first about vitamins. Next comes pleased surprise at the comparatively low cost of the equipment and the low operating expense. "Less than a good used car," is a comment often heard. They are pleased to learn, too, that no special room in the farmhouse need be provided. Questions about specifications and price of equipment are passed on to the manufacturers, as is done in each section of the Farm; inquiries about service go to the light and power company in the visitor's home

town. The number of inquiries rose sharply during Farm Week.

Tuesday was Farm Products Day; Wednesday, Farm Progress Day; Thursday, Farm Women's Day, and Saturday, Farm Boys and Girls Organizations Day. The last day of Farm Week, Sunday, August 18, was Farm Folks Day, and the principal event was a mass assemblage of farmers at the City Plaza Band Shell for a program of speeches, entertainment and the awarding of contest prizes. National farm leaders also spoke at the Farm Boys and Girls celebration on Saturday afternoon.

The Electrified Farm took a prominent part in all the activities and Forward March of America, the other electric utilities' exhibit, also benefited from the increased attendance during the week. Altogether, it was a big seven days in the campaign to make rural America electricity-minded.

Farm Electrification Council Meets in New York

PROMOTION of inexpensive electrical appliances in rural areas will make electricity consumers of many farmers who cannot be reached otherwise, Mr. H. E. Dexter, vice-president, Central Hudson Gas and Electric Corporation, declared in a talk before a meeting of the Farm Electrification Council of the Empire State Gas and Electric Association held in the Hotel New Yorker, New York, on August 15. Such sales do not compete with higher-priced equipment, he added, but actually form an entering wedge for its sale.

Mr. Ralph P. Wagner, general commercial manager, New York Power and Light Corporation, Albany, pointed out that the electric utilities have in the last ten years almost doubled the rural load. Revenues have fallen, however, he said, and this situation must be met by pressing research for new farm uses of electricity while aggressively selling the advantages of known uses. Mr. W. W. Carson, rural service manager, West Penn Power Company, Pittsburgh, spoke on the subject, "Education is the Foundation," and Professor L. D. Kelsey of the New York State College of Agriculture discussed customer service problems on domestic and farm electric appliances, to close the morning session.

At the luncheon meeting, Mr. Truman W. Billings of the Grange League Federation Farm Supplies outlined the electric appliance merchandising program of the G. L. F. Professor H. S. Pringle, New York State College of Agriculture, advocated that minor repairs of household appliances be made by the owners. Mr. John L. Burgan, director of rural development, New York State Electric and Gas Corporation, Ithaca, discussed a night rate for farm users. After hearing committee reports, the council members visited the Electrified Farm Exhibit at the New York World's Fair. Mr. R. G. Harvey, rural service manager, Central New York Power Corporation, Syracuse, is chairman of the council, which represents practically every electric utility operating company in New York having farm customers.

Canadian Electrical Association Convention

THE 50th Annual (Golden Jubilee) Convention of the Canadian Electrical Association was held at the Seigniory Club, Province of Quebec, during the last week of June with approximately 325 delegates registered. The Convention was a complete success, notwithstanding the fact that the original time was reduced and all planned entertainment features eliminated. Sessions were exceptionally well attended—particularly those of the Utilization and Sales and Engineering Sections, both of which were held on June 26.

Highlights of the meeting were the papers presented by A. L. Scaife, General Electric Company; M. E. Skinner, Buffalo, Niagara and Eastern Power Corp.; W. C. Mainwaring, B. C. Electric Railway Co.; C. E. Greenwood and A. B. Campbell, Edison Electric Institute and W. J. Bennett, Bell Telephone Co. of Canada.

The discussion following these papers was particularly lively and brought out many interesting and valuable points for those who attended.

The meeting on the afternoon of June 27 on problems affecting utility operation during the war was presided over by the newly elected President, G. A. Gaherty, President, Montreal Engineering Co. Ltd. Matters discussed included protection against sabotage, training of replacements for men enlisting, interconnection of systems, equipment and apparatus pools, international co-operation, purchase of standard equipment, and peak loads.

Colored movies of previous Conventions were shown in the Club and a guessing contest based on the radio program, "What's My Name," was held during which the "baby pictures" of several prominent members of the Association were shown on a screen. The winners were presented with War Savings Stamps.

At the Executive Session held at noon on June 27, R. A. C. Henry, General Manager, Beauharnois Light, Heat and Power and Vice-President, Montreal Light, Heat and Power Cons., was elected a Vice-President of the C.E.A., and B. M. Hill, General Manager, Canadian Utilities Ltd., Calgary, and A. Vilstrup, Chief Electrical Engineer, B. C. Electric Railway Co. Ltd., were elected to the Executive Committee.

A resolution was passed to be sent to the Dominion Government supporting the use of existing organization in the prosecution of the war and offering the assistance of the C.E.A.

Co-operation in the child evacuation plan of the Engineering Institute of Canada was approved and a sum of $2,500.00 from the capital of the C.E.A. was voted to be used for war purposes at the discretion of the incoming Executive Committee.

At a meeting of the new Officers and Executive the President was given power to form a Committee of three to five members, at any time when questions relating to war effort, or any other matters dealing with the war demanded urgent executive action.

Committees and chairmen were appointed for the season 1940-1941 and the most important change in the Committees is the consolidation into one group of the Kitchen and Laundry Appliances, Electric Housewares and Dealer Relations Committee to be known as the Appliances and Dealer Relations Committee under the chairmanship of J. K. Wilson, Shawinigan Water and Power Co., Montreal.

Mr. McNeely Du Bose, Saguenay Power Co. Ltd., Arvida, Que., was appointed chairman of the General Section and M. C. Gilman, Winnipeg Electric Company, chairman of the Utilization and Sales Section.

A committee of Western delegates was appointed to arrange for the Annual Western (Winter) Conference.

MKB Offers Outstanding Range and Water Heater Programs

SAMPLE kits of materials for The Modern Kitchen Bureau's Fall Electric Range and Water Heater Programs are now being distributed to utility companies and other interested groups throughout the country. First responses indicate an overwhelming acceptance—and no wonder! These two programs are outstanding among the long list of promotions the Bureau has sponsored, and give every promise of even greater success as they swing into action.

The Electric Range Program presents a cooking demonstration that isn't a demonstration, exactly, yet demonstrates the advantages of electric cooking in a startlingly effective manner. Actually, the program is a playlet patterned after the original Lewis Carroll's world-renowned "Alice in Wonderland." "Alice in Electric Wonderland" captures her audiences' interest and affection with the same old White Rabbit, the cantankerous Queen of Hearts, and numerous other Lewis Carroll characters, and soon discovers what "Electric Wonderland" means today in terms of modern living.

Her prize find, of course, is an electric range, and she learns all its fine points from the Royal Home Economist, who is summoned by the Queen to show what delicious meals can be prepared with its help.

Something new in display pieces is the Bureau's "magic mirror," at right, central display feature in the Electric Range Program for the Fall. Display cards to be used on the range itself and window and counter cards are also shown

Script and costumes for this playlet are available through the Bureau, as well as many suggestions about appropriate settings. There is also a complete supply of promotional materials to help build attendance, including window banners, counter cards, mailing folders and mats for local newspaper use.

Feature of the display materials is a "magic" sign which can be used as the center piece of a window or an interior display. This sign appears as an ordinary mirror when its interior lighting is turned off, thus taking advantage of women's natural desire to check up on personal appearance. While they are looking into the mirror, however, the light is turned on, and in place of the mirror there appears Alice herself at the electric range. Wording around the sides and frame offer a strong selling message for electric cooking. It is assumed that new models of electric ranges will be set up in the window on each side of the display sign. Special cards are provided for these ranges, to point out the unusual advantages which the electric range offers.

The "Alice in Wonderland" playlet is provided in a single, complete package.

Donald Duck presents the MKB window banner and display cards for use in the Fall Electric Water Heating Campaign

ready for use. There are complete instructions on how to present the show, what characters are provided, a dialogue script, illustrations of several attractive backdrops for the stage with instructions for building them, complete recipes for the meals to be prepared in front of the audience and a list of all food items required, instructions and materials for publicizing the show and building attendance, and all other information to make it simple and easy for utilities to put on their own show in their own show rooms or auditoriums. Every utility executive should investigate "Alice in Electric Wonderland" and make plans now to use this splendid promotion within the next two months.

The Bureau's Fall Electric Water Heater Program is completely new, and has been developed around that notorious rascal, Donald Duck, who performed with such amazing success for the Bureau earlier in the year. Donald's slogan this time is "Take it Easy with the Luxury of Low-Cost Electric Water Heating." He offers a splendid program which will bring sales results wherever it is put to work.

Among the materials for this promotion is an effective window banner in three colors which will stop passers-by in their tracks and bring them into the store. There is a series of brief radio announcements which can be used over local stations. There are advertising mats for newspaper use, direct mail folders, and a series of attractive window or counter cards, all of which tell the electric water heating story convincingly. Donald has a fondness for rhymes, and these lend a particularly entertaining flavor to the campaign.

The important factor in the water heater promotion is a series of contests which offer liberal rewards to successful contestants, and are designed to offer a powerful sales stimulant to the entire organization.

A contest for electric water heater salesmen offers a total of $250 in cash awards for letters by salesmen on "The Toughest Electric Water Heater Sale I Ever Made." This sets salesmen to thinking of successful electric water heating sales methods, and encourages them to increased efforts in applying their experience and sales skill.

There is also a window display contest, in which water heater window displays may be entered simply by submitting photographs and such descriptive matter as may be necessary. First prize is $100; second prize, $50; and there are ten third prizes of $10 each.

Finally, there is the big utility company contest—a trophy and a cash award of $1,000 to the electric utility doing the best all-round job in the promotion and sale of electric water heaters during the entire year of 1940. Both the window display contest and salesmen's contest will help the utility build its record for this big, over-all contest. Every utility interested in selling electric water heaters should take part in this contest for the encouragement and stimulus which it will provide for the entire sales and promotion staff.

Companies which contemplate participating in any of these contests should notify the Bureau at once of their intention to do so. Complete details will be sent immediately upon request to the Bureau.

Rocky Mountain League and New Mexico to Celebrate 400th Anniversary of Coronado's Explorations

THE 400th anniversary of Francis Vasquez de Coronado's explorations and discoveries in the Southwestern part of what is now the United States, will be jointly celebrated this year by the State of New Mexico and the Rocky Mountain Electrical League. Within sight of the first winter camp established by the famous explorer (now known as Bernalillo) the League, on September 9, at Albuquerque, will open a three-day Convention, the delegates to which will materially swell the attendance of the various already-scheduled Coronado anniversary celebrations throughout the state.

In response to a colorful and appealing official invitation bearing a striking illustration of the great Spanish crusader and his followers, and announcing the Coronado Cuarto Centennial and the 1940 Grand Council of the League, representatives of the electrical industry in 22 states already have made reservations or otherwise signified their intention of being present at the gathering. The invitations, each inscribed with the names of those to whom they are addressed, bear the signatures of League President H. E. Samson, Roswell, New Mexico; Convention Chairman Arthur Prager, Albuquerque, and Mayor Clyde Tingley of Albuquerque.

To carry out the spirit of the occasion Spanish titles and names have been conferred upon various convention and other League officials. League President Henry E. Samson of the Southwestern Public Service Company, Roswell, New Mexico, will be known as Enrique Espejo Samson; Convention Chairman Arthur Prager will become Don Arturo Vasquez de Prager, Maestro del Campo (master of the camp) while Vice-President Gaylord B. Buck, chairman of the Denver Chapter of the League, will be in command of the cavalcade, recruited from all parts of the nation, that will converge upon the pueblo of Albuquerque as a result of the proclamtion of Commander-in-Chief Samson.

A dozen subjects of vital import to all branches of the industry will be discussed in special sessions set aside for them or by speakers of national repute. These will include adequate wiring, fluorescent lighting, street and highway lighting, kitchen modernizing, engineering and accounting.

Lighting and decorative features unique in the history of such a gathering, forming part of the entertainment and decoration features for the Convention, are being arranged. In addition, there will be a colorful pageant on the night of the League's Annual Banquet, depicting Coronado's "Entrada."

Convention headquarters will be in the Hilton hotel.

1940 Prize Winning Advertisements Available

UTILITY companies are invited to place their orders now for the 1940 booklet of prize winning advertisements of the Public Utilities Advertising Association, according to an announcement by Thomas H. Spain, Newark, N. J., who is chairman of the association's Better Copy Contest. This book of 62 pages contains all of the national and regional awards in the association's contest.

Only about 150 copies are available now, Mr. Spain said, and the supply will soon be exhausted. The price is $2.50 and orders should be sent to Mr. Spain, care of Public Service Electric and Gas Company, 80 Park Place, Newark, N. J.

Meeting of the Joint Subcommittee on Development and Research

THE Joint Subcommittee on Development and Research met with its project committees on June 18 in New York, with Mr. A. E. Silver presiding. The various project committees presented progress reports describing the work of the past six months. In addition to the progress reports three technical reports were presented.

Project Committee 1A—Noise Induction presented a technical report entitled "Carrier Frequency Induction Study." The development of the type J, 12-channel carrier telephone system for open-wire lines has extended the range of frequencies employed in carrier-current transmission in the telephone open-wire toll plant up to about 143 kilocycles. This extension of the frequency range from the previous band below about 31 kilocycles has involved, among other problems, consideration of inductive coordination with other carrier systems transmitting frequencies in the same general range. Since frequencies between about 40 and 150 kilocycles are ordinarily employed in applications of carrier current to power transmission lines, an investigation has been undertaken to obtain information concerning the conditions under which interference between carrier systems in the two services might be expected and to study possible coordination measures. This report summarizes the results of the work engaged in thus far which includes both field measurements of induction and the development of methods of estimating noise.

The experimental work has consisted chiefly of measurements of carrier frequency induction in four situations in which toll lines contemplated as possible type J routes were exposed to operating power line carrier systems. Among the installations of the type J system made so far there have been no exposure situations favorable for developmental studies in a case involving operating systems on both the power and telephone lines. Consequently an overall check on methods of estimating noise in specific instances has not been obtained. However, it is believed that the material given in this report provides an indication of the general type of situation likely to require consideration from the coordination standpoint.

This project committee also presented a technical report entitled "Effects of Bonding Exchange Aerial Telephone Cable Sheaths to Multi-Grounded Power Neutrals."

The sheath of an aerial telephone cable, when grounded at one or more points, provides nearly perfect shielding of the enclosed conductors against external *electric* fields. Since aerial cables are usually grounded at the central-office end, this type of shielding is nearly always present in cable exposures to power circuits.

A cable sheath may also produce a substantial degree of shielding against *magnetic* induction from currents in a paralleling power circuit, provided it is connected to low-impedance grounds at or beyond both ends of the exposure. Magnetic cable-sheath shielding, obtained in this manner, is often employed as a coordinative measure in noise-frequency induction problems involving telephone exchange cable circuits. In some cases, however, it has been found inconvenient or relatively expensive to provide the low-impedance ground required for this purpose, at the far end (from the central office) of an exposure.

The rapidly increasing use, in recent years, of the multi-grounded common-neutral system has tended to increase the inductive influence of urban power distribution lines at noise frequencies. For faults between phase conductor and primary neutral, it has also tended to increase the voltage across station protector blocks so that, in some cases, under fault conditions, the voltage is sufficient to cause flashover but not necessarily permanent grounding of the telephone protector. At the same time, however, the common neutral has made available a new means of obtaining low-impedance grounds for shielding against both noise and low-frequency induction. In urban and suburban territory aerial telephone cables and overhead power distribution circuits are generally carried either on jointly-used poles or on separate pole lines at roadway separation. Under these conditions, bonding the telephone cable sheath to the common neutral conductor provides a shielding ground which, in most cases, is easier and less expensive to install and maintain than other grounds of equally low impedance.

In water-pipe areas the secondary neutral is generally connected to the water pipe at each customer's premises. Thus, in such areas, the common-neutral system provides a continuous primary neutral of low impedance to ground. In non-water-pipe areas the secondary neutral is connected to the best ground available. In some cases this may be a private water system of relatively low impedance-to-ground, while in other instances it may be a driven ground of considerably higher impedance. Experience indicates that, in general, the impedance to ground of a common neutral, in areas sufficiently built up to require telephone exchange cable, will be of the order of 1 ohm or less. However, if the impedance to ground of the common neutral is substantially higher than in public water system areas, its value as a shielding ground may be materially impaired.

This report discusses the effects of bonding telephone cable sheaths to power system neutral conductors on the noise, low-frequency voltage and electrolysis conditions in the telephone plant. Both water-pipe and non-water-pipe areas are covered.

Project Committee 2J—Low-Frequency Influence and Susceptiveness presented a technical report on Neutralizing Transformers. This report describes two types of neutralizing transformers, one called the "power station" neutralizing transformer, developed for use on communication circuits subject to ground potential rise at power stations; the other called the "toll line" neutralizing transformer, intended for reducing the effects of low-frequency induction on open-wire telephone lines. Following a general introduction, a section is devoted to the first type of transformer, discussing its functions and uses. Characteristics are given from which the effectiveness of these transformers in particular situations can be determined, following which the methods that have been used in installing and protecting them and field experience with them are discussed. The last section deals with the second type of neutralizing transformer, giving the theory of its operation and a description of its characteristics, including its reaction on communication facilities, most of which were determined from field measurements as described.

The report on Carrier Frequency Induction was recommended for issuance as a provisional report, and the other two reports were recommended as engineering reports.

Personnel of E. E. I. Committees for 1940-1941

APPOINTMENTS to E.E.I. Committees for the administrative year 1940-1941 have been made by President Kellogg, with the exception of the Committees under the General Sales Committees whose membership will be announced in a subsequent issue.

The committees which now have practically complete personnel include the following: Operating; Accounting Executive; Classification of Accounts; Customers' Relations, Commercial Accounting and Collections; Depreciation; Plant Accounting and Records; Purchasing, Stores and Transportation; Accident Prevention; Electrical Equipment; Meter and Service; Hydraulic Power; Prime Movers; Transmission and Distribution; Insurance; Rate Research; Statistical.

The personnel of the Operating Committee is listed on the inside of the back cover of the BULLETIN. Personnel of other committees follow:

ACCOUNTING EXECUTIVE COMMITTEE

Chairman, G. H. BOURNE, The Commonwealth & Southern Corp., New York, N. Y.

H. D. ANDERSON, American Gas & Electric Service Corp., New York, N. Y.

J. H. BISSELL, Stone & Webster Service Corp., Boston, Mass.

F. J. BRETT, Niagara Hudson Power Corp., New York, N. Y.

A. S. CORSON, The United Gas Improvement Co., Philadelphia, Pa.

H. C. DAVIDSON, Consolidated Edison Co. of New York, Inc., New York, N. Y.

F. B. FLAHIVE, Columbia Gas & Electric Corp., New York, N. Y.

H. L. GRUEHN, Consolidated Gas Electric Light & Power Co., Baltimore, Md.

FRANKLYN HEYDECKE, Public Service Electric & Gas Co., Newark, N. J.

C. E. KOHLHEPP, Wisconsin Public Service Corp., Milwaukee, Wisconsin.

J. M. KRAMARSIK, The Connecticut Light & Power Co., Hartford, Conn.

B. M. LESTER, Oklahoma Gas & Electic Co., Oklahoma City, Okla.

J. H. LOBBAN, The Detroit Edison Co., Detroit, Mich.

A. G. MITCHELL, Philadelphia Electric Co., Philadelphia, Pa.

B. S. RODEY, JR., Consolidated Edison Co. of New York, Inc., New York, N. Y.

H. H. SCAFF, Ebasco Services, Inc., New York, N. Y.

R. H. SMITH, The Cleveland Electric Illuminating Co., Cleveland, Ohio.

Guest Member, C. P. STAAL, Southern California Edison Co., Ltd., Los Angeles, Cal.

Members Ex-Officio, H. B. HARDWICK, The Commonwealth & Southern Corp., New York, N. Y.

A. M. HARTOGENSIS, Ebasco Services, Inc., New York, N. Y.

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Moving Pictures to Show

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supporting testimony to the subject of depreciation, especially observed depreciation, is evident. This applies particularly to the illustration of procedure. It could be shown, for instance, how poles were examined. The excavation at the bottom, the application of increment borers to cut out pieces for laboratory inspection, discussion before arriving at a condition percent, comparison of sound wood with rot in its various stages, the entire painstaking investigation of detail including transformers, crossarms, guys, etc., could be impressed on a court with a vividness not approached by the most skillful direct examination. The camera could follow the examination of a building, the inspection of the foundation and walls, the plumbing, the woodwork and all the other items inspected to enable the witness to determine condition. It could be shown how boilers are extinguished to be inspected from the inside, how earth is excavated and coupons cut from the exposed mains, how soil and metal and wood are analyzed in the laboratory.

There could be sequences showing the study of operating records, with special attention given to regular maintenance and trouble-hunting procedures, consultation with the company's operating personnel, etc.

Obsolescence and inadequacy might likewise be demonstrated with the help of graphs and charts. To show that the system has kept pace with increased demands, the demand curve might be presented as growing from year to year, approaching capacity, which then in turn is stepped up. The machines serving the system might be compared with those most recently put on the market, with a visual explanation of the major or minor effects of changes in design.

In short, the availability of this method of presenting evidence appears to be limited only by the ingenuity of counsel and of the engineers charged with its preparation and by the willingness of the commissions and courts to receive it. This is not the place to discuss the latter point. It is sufficient to say that the courts have at all times kept step, in determining what evidence was acceptable, with the progress of science. Films have already served as proof of last wills, according to reports. Certainly this legal obstacle does not appear so insuperable as to discourage the utility industry from using an excellent medium to present its story.

PERSONALS

COOPERATION by the electrical industry in the national defense program has been further evidenced recently by appointments of industry executives to state and national defense committees and the creation of new posts for defense purposes in the organizations of utility companies.

C. A. COLLIER, vice-president in charge of sales, Georgia Power Company, has been appointed by Gov. E. D. Rivers as Georgia's representative on the Southern Industrial Mobilization Committee for National Defense.

HENRY M. PRICE, superintendent of the Potomac Edison Company at Cumberland, Md., has been named by Gov. Herbert R. O'Conor as a member of the Maryland Council of Defense and Resources.

PAUL SCHOELLKOPF, president, Niagara Hudson Power Corp., is a member of the recently appointed State Council of National Defense which will advise Gov. Lehman on all matters pertaining to the national preparedness program as applied to the state of New York.

CHARLES E. WILSON, president, General Electric Company, will represent the electrical manufacturers on the New York council.

L. W. NIMS, manager of the Ogden division of Utah Power and Light Company since 1930, has been named special military and industrial mobilization liaison officer for the company, with headquarters in Salt Lake City. He will have charge of directing the company's activities to provide ample supply of electric power for war industries, to render assistance to the military forces, to civic leaders in their defense problems and to business organizations in adjusting and increasing production for rearmament needs.

RICHARD LINCOLN has been appointed executive assistant to the vice-president in charge of sales of the Boston Edison Company. He was formerly personnel director and has also served the company as superintendent of the appliance department.

F. H. MCCULLOUGH, formerly general sales manager of the Kansas Gas and Electric Company, has been appointed Wichita division manager, it was announced by M. F. Gill, the company's new president.

SAM BROLUND succeeds to the position of general sales manager. He has been with the Kansas Gas and Electric organization since 1922.

C. O. WIAND, whose service with the company dates from 1923, has been appointed residential sales manager.

J. K. MOORE has been named Guthrie district manager of the Oklahoma Gas and Electric Company, succeeding W. H. Boasen, retired. Mr. Moore has been with the company since 1920.

E. F. DETURK has been appointed electrical engineer for Long Island Lighting Company at Mineola, New York. He was formerly with Metropolitan Edison Company, Reading, Pa., as transmission and distribution superintendent.

JUSTIN R. WHITING, newly elected president of Commonwealth and Southern Corporation, has been elected chairman of the board of directors of Ohio Edison Company, a subsidiary.

J. D. HENKEL, JR., division manager of Alabama Power Company at Huntsville, Ala., for the past ten years, has been appointed general manager of the electrical distribution system of Huntsville and Madison County, which has been transferred to the city of Huntsville by the utility company.

GLENN C. MEADER, formerly in charge of distribution for Northern States Power Company in the La Crosse, Wis., area, has been appointed distribution engineer for the company with headquarters at Eau Claire.

P. A. PETERSON, who has been associated with the company in the Eau Claire and Chippewa Falls districts for several years, succeeds Mr. Meader at La Crosse.

MERRILL E. SKINNER, vice-president, Buffalo Niagara Electric Corporation, has been named chairman of the industrial development and mobilization committee of the Buffalo Chamber of Commerce.

HARRY E. CHRISTEN, for several years line foreman for Arkansas Power and Light Company in Little Rock, has been appointed director of the company's accident prevention department.

W. M. SHEPHERD, whom Mr. Christen succeeds, will in the future devote his entire time to the company's rural development department.

GEORGE L. ELLERBECK, southern division manager of the Utah Power and Light Company, has been appointed manager of the Ogden division, succeeding L. W. Nims, who has been transferred to new duties. Mr. Ellerbeck became division manager in 1937, having previously served the company in the capacities of supervisor of commercial sales in the Salt Lake division, system assistant commercial manager and system industrial manager.

F. J. LACEY, after nine years' service as advertising manager and public relations director of the Tampa (Fla.) Electric Company, has accepted appointment to the Cincinnati staff of the Ralph H. Jones Company, advertising agency.

JOHN C. O'CONNELL, commercial representative of Potomac Edison Company at Cumberland, Md., has been transferred to rate research work in the company's rate and contract department and will have headquarters at Hagerstown.

W. HAMILTON RODGERS, JR., has been promoted from assistant advertising manager of the Pennsylvania Power and Light Company, Allentown, to the post of advertising manager.

Fall Convention of Maryland Association

The annual Fall Convention of The Maryland Utilities Association will be held at the George Washington Hotel, Ocean City, Maryland, on Friday and Saturday, September 6 and 7, 1940.

There will be an informal joint meeting of the Gas, Electric, and Transportation Groups, with addresses by speakers of national reputation and each address will present an authoritative view on a topic of current interest. Entertainment will be provided including a banquet and talk.

Depreciation - Science or Philosophy

(*Continued from page* 385)

We know that lack of foresight cannot be reminded by inordinate charges in the future, so that any deficiency that should exist when replacements become necessary must be made good out of stockholders' money. Since the results of any depreciation policy will affect us most, we ought to have something to say about it. You cannot tear power away from responsibility."

The commissioner does not look convinced. "The courts don't seem to agree with you, certainly not of late." "Oh, don't they," interrupts the manager. "I wasn't going to mention any cases, because I feel there has been far too much litigation about these matters in the past. I am sure that regulation has come to stay and that it ought to stay, because there is certainly a tremendous public interest involved in the proper operation, financing, and accounting of a utility. But there is nothing in the cases, so far as I can judge, that takes away the right of the companies to run themselves."

"What cases have you in mind?" asked the commissioner.

"Well," replies the manager, "what about the Lindheimer Case? There the telephone company did the very thing which we are trying to avoid, and which the commission insists that we do; namely, they built up too large a reserve. And what did the court say? Why, the court said that the annual depreciation allowance was too high, and that they couldn't charge it to operating expenses. That's precisely what I've been trying to tell you all day. In the AT&T Case if I can remember right, the judges got a lot of things off their chests, that had perhaps better be left unsaid. They gave you a free hand to impose most any method that was not so entirely at odds with fundamental principles of correct accounting as to be the expression of a whim rather than an exercise of judgment. They gave you permission to prescribe a system of accounts, even if it appeared to be unwise or burdensome or inferior to another.

"The point I wish to make is that the court expressly divorced accounting from management. Regulation of our accounting was not to give the commission additional jurisdiction, but enable them to properly regulate such matters as were really already within their jurisdiction, and the determination of management policy was hardly considered within your jurisdiction. And, look at what the FCC said about excessive depreciation accruals in its report on the special telephone investigation. Consider the recent testimony before the Temporary National Economic Committee to the effect that most of our large industrial units have habitually and systematically piled up such huge reserves that they never have to go into the open money market with the result that new capital must join labor in the ranks of the unemployed."

The commissioner rises. "We need not decide that question today. In the meantime, I shouldn't worry too much in your place. Every commission realizes that effective regulation is impossible without *flexibility*. When you come to us, you may be assured that we will give fitting consideration to the 'special circumstances' of your case."

CONVENTIONS AND MEETINGS

SEPTEMBER

4-6	Pennsylvania Electric Association, Bedford Springs Hotel, Bedford Springs, Pa.
6-7	Maryland Utilities Association, George Washington Hotel, Ocean City, Md.
9-11	Rocky Mountain Electrical League, Albuquerque, N. M.
9-12	Illuminating Engineering Society, Essex and Sussex Hotel, Spring Lake, N. J.
16-17	Wisconsin Utilities Association, Accounting Section, Lawsonia Hotel, Green Lake, Wis.
25-27	Indiana Electric Association, French Lick Springs Hotel, French Lick Springs, Ind.
26-27	The Empire State Gas and Electric Association, Westchester Country Club, Rye, N. Y.

OCTOBER

4	General Sales Committee, E.E.I., The Homestead, Hot Springs, Va.
7-8	Electrical Equipment Committee, EEI, Jefferson Hotel, Richmond, Va.
7-10	American Gas Association, Atlantic City, N. J.
14-16	Transmission and Distribution Committee, EEI, Henry Grady Hotel, Atlanta, Ga.
14-17	International Municipal Signal Association, Roosevelt Hotel, Jacksonville, Fla.
21-23	National Electrical Contractors Association, George Washington Hotel, Jacksonville, Fla.
27-Nov. 1	National Electrical Manufacturers Association, Waldorf-Astoria Hotel, New York, N. Y.

NOVEMBER

11-12	Wisconsin Utilities Association, Electrical Section, Commercial and Technical Divisions, Pfister Hotel, Milwaukee, Wis.

New Better Light-Better Sight Promotion Material

SUGGESTIONS and new and colorful material for use in the promotion of Better Light-Better Sight principles make up a portfolio which is now available from the National Better Light-Better Sight Bureau, 420 Lexington Avenue, New York, N. Y. Mats of newspaper advertisements, calendars, picture postcards, an "eye guard," folders for enclosure with bills and a booklet outlining Clean Up-Paint Up-Light Up campaigns, samples of which are included in the portfolio, all tell the story of proper illumination in an interesting and attractive way.

With 30,000,000 children soon to begin another school term, one of the most timely pieces is a booklet entitled "Priceless Eyes." Designed as a teacher's manual, it is described by the Bureau as "the Science of Seeing and Better Light-Better Sight condensed to 19 pages of factual and authoritative information." The recommended plan for its use is presentation to teachers in quantities sufficient to provide a copy for each pupil, study of the manual being made a class project. Similar in subject matter but more general in purpose is the pamphlet, "The Effect of Illumination on the Eyes," a collection of five articles by eminent oculists, originally published in the magazine *Hygeia*.

New figures on the success of lighting promotion in the residential market also are included in the folder. They show that sales of I. E. S. Better-Sight Lamps have now reached 12,000,000, or almost one-eighth of the ultimate market estimated at 100,000,000. The Bureau has set sales of 2,400,000 of these lamps as the immediate goal for the 1940-41 season. It expects to add 2,000,000 sales to the 7,000,000 already recorded for pin-to-wall lamps, with the ultimate goal at 75,000,000. The quota of a million-and-a-half adapters for the season would double the number of these fixtures already in use, but leave plenty of distance this side of the saturation figure of 50,000,000.

The promotion of the new Certified Fixtures will get under way this season, too. Five hundred thousand is this campaign's immediate goal for 1940-41, and the ultimate market has been set at 25,000,000.

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1940-1941

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Depreciation, H. L. GRUEHN, Consolidated Gas Electric Light & Power Co., Baltimore, Md.

Plant Accounting and Records, H. B. HARDWICK, The Commonwealth & Southern Corp., New York, N. Y.

Purchasing Stores and Transportation, G. MCDOUGALL, Consolidated Edison Co. of New York, Inc., New York, N. Y.

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